

BEARINGS FOR
+ AGRICULTURAL MACHINERY



Photo courtesy of Kverneland AS

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As one of the world's leading manufacturers of rolling bearings, linear technology components and steering systems, we can be found on almost every continent – with production facilities, sales offices and technology centres – because our customers appreciate short decision-making channels, prompt deliveries and local service.



The NSK company

NSK commenced operations as the first Japanese manufacturer of rolling bearings back in 1916. Ever since, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors. In this context, we develop technologies in the fields of rolling bearings, linear systems, components for the automotive industry and mechatronic systems. Our research and production facilities in Europe, Americas and Asia are linked together in a global technology

network. Here we concentrate not only on the development of new technologies, but also on the continuous optimisation of quality – at every process stage.

Among other things, our research activities include product design, simulation applications using a variety of analytical systems and the development of different steels and lubricants for rolling bearings.

Partnership based on trust – and trust based on quality

Total Quality by NSK: The synergies of our global network of NSK Technology Centres. Just one example of how we meet our requirements for high quality.

NSK is one of the leading companies with a long tradition in patent applications for machine parts. In our worldwide research centres, we not only concentrate on the development of new technologies, but also on the continual improvement

of quality based on the integrated technology platform of tribology, material technology, analysis and mechatronics.

More about NSK at www.nskeurope.com or call us on +44 (0)1636 605 123



Introduction

Agricultural applications present considerable challenges for all mechanical components. Contamination, moisture, vibration and shock loads are just some of the factors which these components have to cope with. As one of the world's leading bearing manufacturers, NSK has risen to this challenge. In addition to a wide range of standard components, the company is highly flexible when it comes to developing special, customised solutions for its customers. NSK's Neuweg production site in Munderkingen, Germany, in particular specialises in bespoke solutions of this kind.

Established in 1954, Neuweg has a tradition of manufacturing bearings, primarily for agricultural machinery. Neuweg became part of the NSK Group in 1990. Staff at the site now develop NSK, RHP and NWG (Neuweg) branded products and produce them in line with NSK's premium standards of quality.



Agri Disc Hub bearing units

The NSK Agri Disc Hub bearing units use double-row angular-contact ball bearings which are capable of accommodating heavy radial and axial loads.

The units are screwed straight onto the discs, with an O-ring set into the bearing housing (**figure 2**) protecting the bearing from contamination and moisture on this side.

On the arm side of the unit, the bearing is protected by a cassette seal developed specially for this use (**figure 1**). This seal has successfully withstood extensive testing and can even handle tough operating conditions like the use of liquid manure.

In addition to this, the cassette seal prevents moisture and water from getting into the unit, even if the machine is cleaned with pressure washers after use (**figure 3**).

The bearings are also protected by a 2nd cassette or a DDU seal. This stops also lubricant from escaping, ensuring maintenance-free running.

The Agri Disc Hubs use a high-performance lubricant developed by NSK specifically for conditions of this kind.

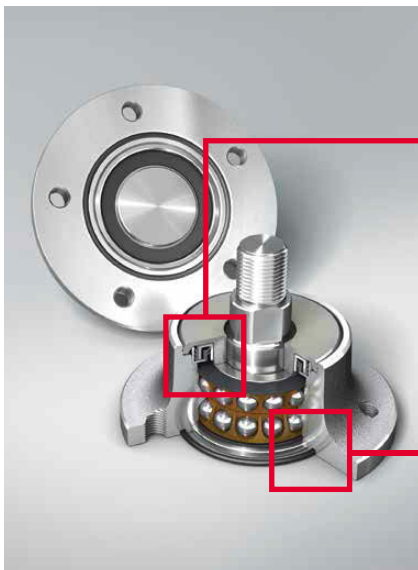


Figure 1: Cassette seal



Figure 2: O-ring seal



Figure 3: Tested using a water jet for 200 hours. At the end of the test, there was no sign of water having penetrated the cassette seal.

Product advantages: the Agri Disc Hub

Advantages for machine manufacturers:

Factor	Description	Savings
Development	In addition to standard ranges, NSK offers solutions for specific customers and applications. The machine manufacturer does not need to invest in in-house development.	Engineering capacity, development costs
Testing	Thanks to NSK's experience and core specialisms such as seal technology, bearing design and the development of bearing assemblies there is no need for extensive tests on individual components and assemblies. The use of tried and tested technology provides additional safeguards.	Engineering capacity, test benches - in some cases for individual components as well - field testing
Procurement and logistics	Clients source a complete solution. There is no need for different suppliers and individual components to be audited and approved. Storage and materials planning for these individual components is also eliminated.	Purchasing and procurement capacity, storage
Assembly	There is no time-consuming assembly of various individual components: the Agri Disc Hub is mounted straight to the machinery.	Assembly time
Guarantee	Defect analyses, diagnostics, etc. become superfluous.	Defect analyses, repairs, guarantee

Advantages for farmers:

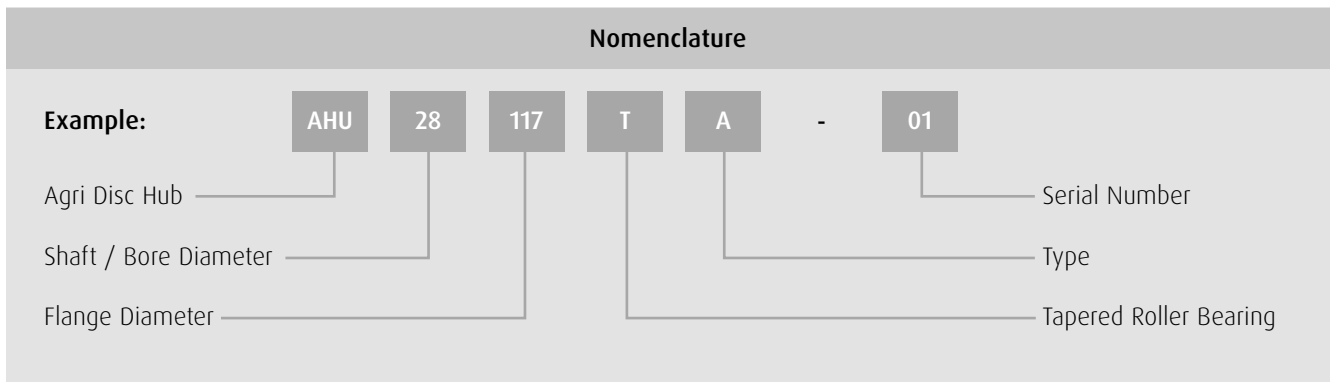
Factor	Description	Savings
Productivity	No need for repairs due to bearing failures caused by insufficient lubrication and contamination. This increases the machinery's availability.	Downtime, spare parts, repair service
Contamination	Field tests have proved that the cassette seal developed specially for the NSK Agri Disc Hubs provides reliable protection from contamination such as clay, sand, dust, plant fibres, liquid manure and other fertilisers, water and moisture ingress. The cassette seal is also protected from stones by a steel disc.	Bearing failures caused by contamination (increases service life by between five and ten times*)
Lubrication/grease	NSK Agri Disc Hubs are sealed bearing units with lifelong lubrication. This means there is no need for regreasing.	Saves time and prevents grease leakage in the field (saves approx. 25 kg of lubricant a year and approx. ½ hour per day of use, depending on the machine*)

* All figures are the result of field tests in close collaboration with customers and internal investigations.

Nomenclature

NSK currently makes Agri Disc Hubs for disc diameters of up to 800 mm. Various flanged and shaft types are available.

The product range is constantly being expanded in close collaboration with our customers. Bespoke solutions can usually also be developed without any problems.

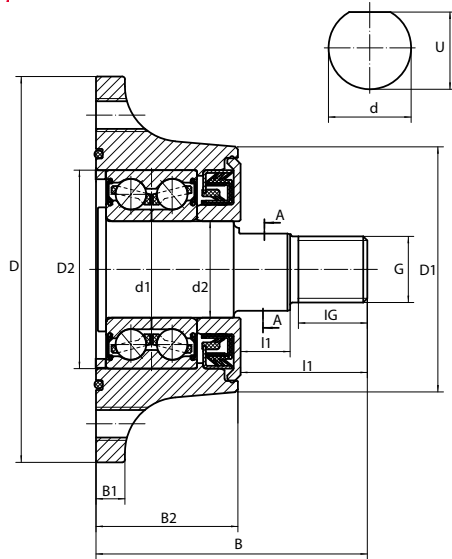


Agri Hub

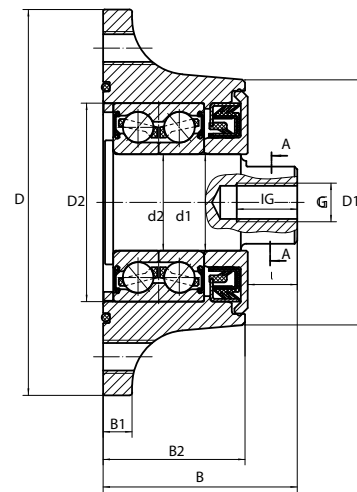


Product range

Type A

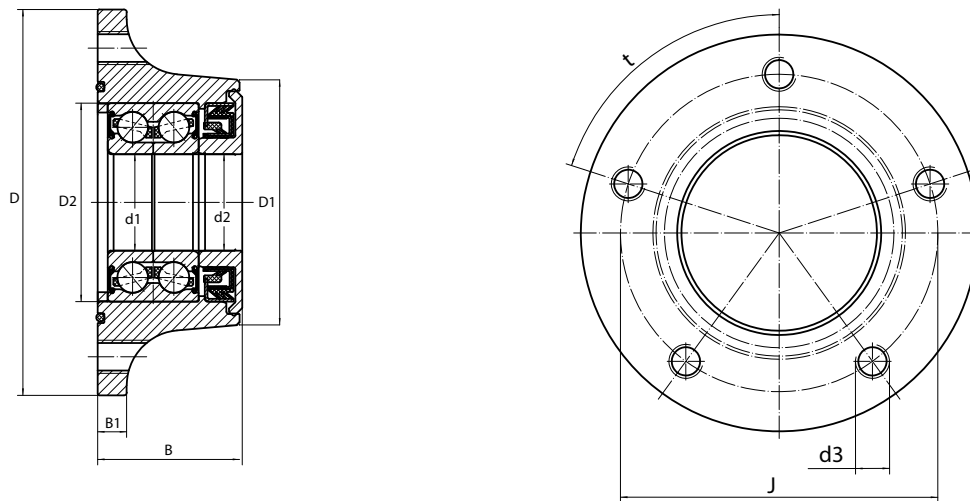


Type B



NSK Ref No.	d	D	D1	D2	J	d1	d2	d3	t
AHU17085C-01	-	85	50	40	65	17	40	6,3	6 x 60°
AHU20091C-01	-	91	57	47	75	20	47	6,8	6 x 60°
AHU20091C-02	-	91	57	47	75	20	47	6,8	6 x 60°
AHU20100A-01	20	100	60	47	80	20	20	M10 x 1	5 x 72°
AHU20100B-01	20	100	60	47	80	20	20	M10 x 1	5 x 72°
AHU20120A-01	20	120	60	47	100	20	20	M10 x 1.5	6 x 60°
AHU20120B-01	20	120	60	47	100	20	20	M10 x 1.5	6 x 60°
AHU24135A-01	24	135	89	72	110	35	35	M12 x 1.75	4 x 90°
AHU28117A-01	28	117	89	72	98	37	35	M12 x 1.25	4 x 90°
AHU28117A-02	28	117	89	72	98	37	35	M12 x 1.25	5 x 72°
AHU28117A-03	28	117	89	72	98	37	35	M12 x 1.25	6 x 60°
AHU28117A-01	28	117	89	72	98	37	35	13	4 x 90°
AHU28140A-01	28	140	89	72	107.95 (4 1/4")	35	35	M12 x 1.25	5 x 72°
AHU30117A-01	30	117	89	72	98	37	35	M12 x 1.25	4 x 90°
AHU30140A-01	30	140	89	72	112	35	35	M12 x 1.5	5 x 72°
AHU34120B-01	34	120	89	72	100	35	35	M10 x 1.5	6 x 60°
AHU34140B-01	34	140	89	72	120	35	35	M10 x 1	4 x 90°
AHU34140B-02	34	140	75	72	120	35	35	M10 x 1	4 x 90°
AHU44140B-01	44	140	100	83	122	45	45	M12 x 1.75	6 x 60°
AHU45175B-01	45	175	100	83	133.35 (5 1/4")	45	45	12,7	5 x 72°
AHU45175TB-01	45	175	100	82		45	45	12,7	5 x 72°
Customer request:									

Type C



U	I	I1	B	B1	B2	G	IG	Disc Diameter*	Design	Tightening Torque
-	-	-	48,0	8,0	45,0	-	-	up to 400mm	C**	135 Nm
-	-	-	40,0	6,0	40,0	-	-	up to 400mm	C**	135 Nm
-	-	-	40,0	6,0	40,0	-	-	up to 400mm	C**	135 Nm
18,5	35	10,5	73,0	7,0	38,0	M16 x 2	22,5	up to 500mm	A	135 Nm
18,5	9	-	47,0	7,0	38,0	M14 x 1.5	20,0	up to 500mm	B	135 Nm
18,5	35	10,5	73,0	8,0	38,0	M16 x 2	22,5	up to 500mm	A	135 Nm
18,5	9	-	47,0	8,0	38,0	M14 x 1.5	20,0	up to 500mm	B	135 Nm
22,7	55	19,0	132,0	11,0	77,0	M24 x 1.5	36,0	up to 700mm	A	350 Nm
25,5	42	13,0	102,0	10,5	60,0	M22 x 1.5	25,0	up to 700mm	A	350 Nm
25,5	42	13,0	102,0	10,5	60,0	M22 x 1.5	25,0	up to 700mm	A	350 Nm
25,5	42	13,0	102,0	10,5	60,0	M22 x 1.5	25,0	up to 700mm	A	350 Nm
25,5	42	13,0	102,0	10,5	60,0	M22 x 1.5	25,0	up to 700mm	A	350 Nm
25,5	42	13,0	94,5	10,5	52,5	M22 x 1.5	25,0	up to 700mm	A	350 Nm
27,5	46	13,0	106,0	10,5	60,0	M22 x 1.5	25,0	up to 700mm	A	350 Nm
28,0	46	18,0	98,5	10,5	52,5	M24 x 2	25,0	up to 700mm	A	350 Nm
31,0	14	-	66,5	13,0	52,5	M20 x 1.5	26,0	up to 700mm	B	350 Nm
31,0	19	-	71,5	10,5	52,5	M20 x 2.5	26,0	up to 700mm	B	350 Nm
31,0	19	-	101,5	10,5	82,5	M20 x 2.5	26,0	up to 700mm	B	350 Nm
40,0	14	-	79,8	10,0	65,8	M24 x 2	26,0	up to 800mm	B	400 Nm
41,0	37	-	103,8	14,0	66,8	M24 x 2	40,0	up to 800mm	B	400 Nm
41,0	37	-	103,8	14,0	66,8	M24 x 2	40,0	up to 1000mm	B	400 Nm

* The disc diameters provided only serve as a point of reference because the suitability of the Agri Disc Hubs depends to a large extent on the application and operating conditions.

** See page 11.

Examination following field testing



Typical picture of a compact disc harrow covered in dirt following the use of liquid manure.



An NSK employee removing the unit from the machine arm.



The picture shows that no contamination or rust is present beyond the O-ring.



No dirt was able to get through the cassette seal. The seal is in outstanding condition.



Once the bearing had been dismantled, no dirt was found inside the bearing or in the lubricant.



There is no sign of damage or wear to the raceways.

Result of the examination:

Although the Agri Disc Hub bearing unit was used in extreme operating conditions in a compact disc harrow incorporating liquid manure, the bearing showed no signs of contamination, damage or wear. The Agri Disc Hub - and therefore the compact disc harrow - could have remained in use with no problems at all.

*Fieldtest 3.000ha

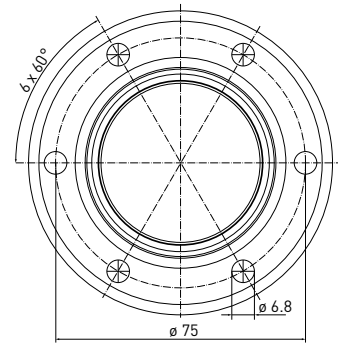
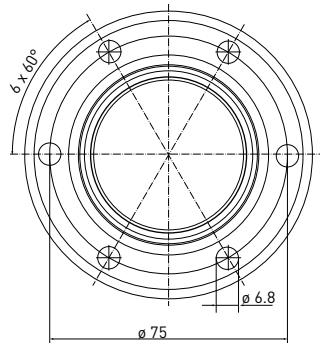
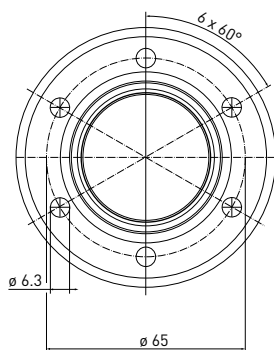
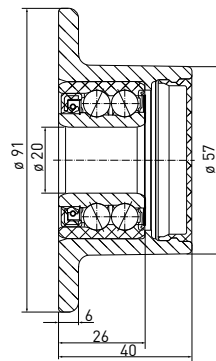
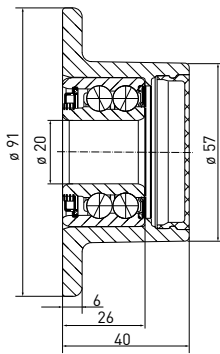
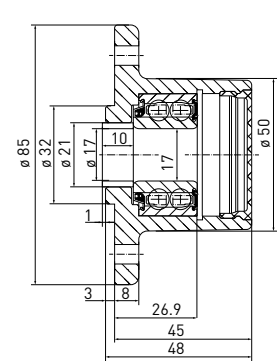
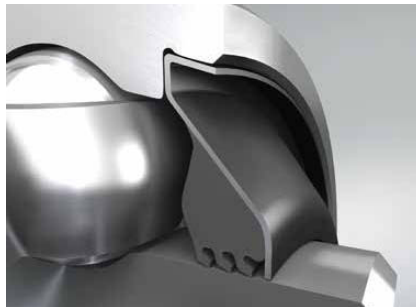
Agri Hubs for Seeders



AHU17085C-01

AHU20091C-01

AHU20091C-02

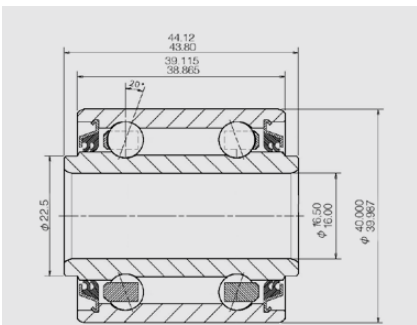


Reference		d (mm)	D (mm)	B (mm)	C (kN)*	Co (kN)*	crowned outer ring
Lip Seal	Shield						
LB6203-2RSR	LB6203-ZZR	17	47	12	9.55	4.75	R500
LZ6203-2RSR	LZ6203-ZZR	17	47	12	9.55	4.75	-
LB6204-2RSR	LB6204-ZZR	20	52	14	12.80	6.60	R500
LZ6204-2RSR	LZ6204-ZZR	20	52	14	12.80	6.60	-
LB6205-2RSR	LB6205-ZZR	25	62	15	14.20	7.90	R500
LZ6205-2RSR	LZ6205-ZZR	25	62	15	14.20	7.90	-
LB6206-2RSR	LB6206-ZZR	30	72	16	19.45	11.30	R500
LZ6206-2RSR	LZ6206-ZZR	30	72	16	19.45	11.30	-
LB6207-2RSR	LB6207-ZZR	35	80	17	25.50	15.30	R500
LZ6207-2RSR	LZ6207-ZZR	35	80	17	25.50	15.30	-
LB6208-2RSR	LB6208-ZZR	40	85	18	29.00	18.00	R500
LZ6208-2RSR	LZ6208-ZZR	40	85	18	29.00	18.00	-

* Load ratings calculated as ball bearings

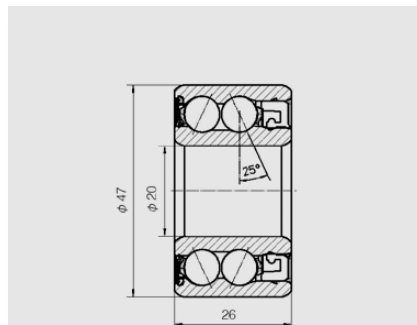
Special bearings for the agricultural sector available from stock

Gauge Wheel bearings



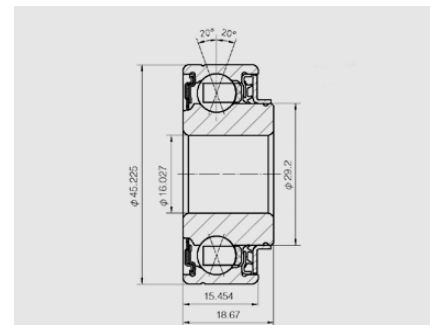
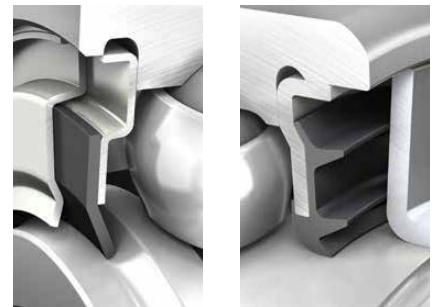
Part no.: DAC164044
Description: Extra wide double-row angular-contact ball bearing
Load ratings: C: 15 kN
 C₀: 9.25 kN
Use: Cylinders, wheels, rollers, etc

Double-row angular-contact ball bearing



Part no.: 3204BRSRWDRB26TNG
Description: Double-row angular-contact ball bearing with a radial shaft seal on one side
Load ratings: C: 19.6 kN
 C₀: 12.5 kN
Use: Sowing machines, strip tilling, tilling in general

Four-point contact bearing



Part no.: QJ6204S03LSLB-2
Description: Four-point contact bearing with an extended inner ring, various special seals and a flinger on one side
Load ratings: C: 20 kN
 C₀: 12.7 kN
Use: Sowing machines, strip tilling, tilling in general

Examples of customer-specific special bearings

Besides producing special bearings for general agricultural applications, NSK also develops customer-specific special bearings. These are individually tailored to meet the machine manufacturer's specification for the application in question. The focus here is often on bespoke seal designs, but in some cases specific flange concepts are also required. Especially NSK's Neuweg site focuses on customer-specific special bearings, which it also produces in small and medium batch sizes.



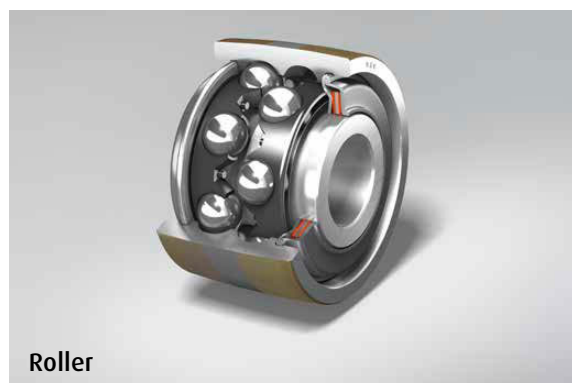
Flanged bearing



Roller



Flanged bearing



Roller



Insert Ball Bearing with Metal Flange



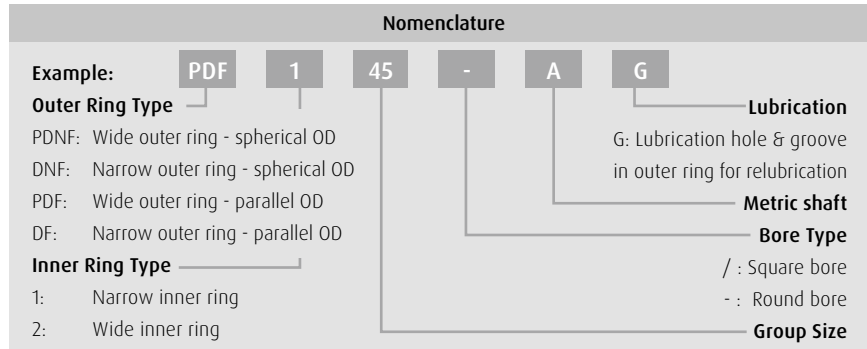
Double Row Tapered Roller Bearing

Disc harrow bearings for square shafts

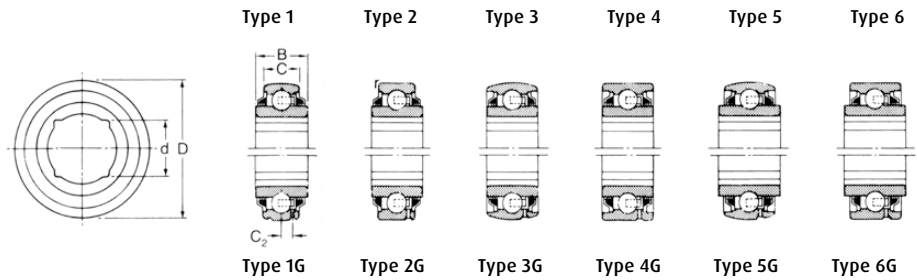
PDFN and DNF series

PDF and DF series

Disc harrow bearings from the Self-Lube® series are also often used in agricultural machinery. The bearings are produced under the RHP brand and come in a wide range of sizes and designs, including round and square bores. Because of the tough operating conditions they are exposed to, disc harrow bearings are supplied with a special triple-lip seal made from nitrile rubber reinforced with steel.



Square shaft		Reference No		Type	Square bore dimensions				External dimensions			
		Spherical outer diameter	Cylindrical outer diameter		d		Tolerance		D		B	
mm	Inch				mm	Inch	mm	Inch	mm	Inch	mm	Inch
	7/8		2/DNF240/7	1	23.09	0.909	-0.20	-0.008	80	3.1496	36.51	1.438
	7/8		PDFN240/7Y	5	23.09	0.909	-0.20	-0.008	80	3.1496	36.51	1.438
	1		DNF140/8Y	1	26.30	1.035	-0.20	-0.008	80	3.1496	30.16	1.188
	1		DNF240/8Y	1	26.30	1.035	-0.20	-0.008	80	3.1496	36.51	1.438
	1		2/DNF240/8	1	26.30	1.035	-0.20	-0.008	80	3.1496	36.51	1.438
	1			2	26.30	1.035	-0.20	-0.008	80	3.1496	30.16	1.188
	1		DF140/8Y	2	26.30	1.035	-0.20	-0.008	80	3.1496	30.16	1.188
	1		DF240/8Y	2	26.30	1.035	-0.20	-0.008	80	3.1496	36.51	1.438
	1		2/DF240/8	2	26.30	1.035	-0.20	-0.008	80	3.1496	36.51	1.438
	1		PDFN240/8Y	5	26.30	1.035	-0.20	-0.008	80	3.1496	36.51	1.438
	1		1/PDNF240/8G	5G	26.30	1.035	-0.20	-0.008	80	3.1496	36.51	1.438
	1			6	26.30	1.035	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8		DNF140/9	1	29.44	1.159	-0.20	-0.008	80	3.1496	30.16	1.188
	1 1/8		DNF240/9Y	1	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8		2/DNF240/9	1	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8			2	29.44	1.159	-0.20	-0.008	80	3.1496	30.16	1.188
	1 1/8		DF140/9Y	2	29.44	1.159	-0.20	-0.008	80	3.1496	30.16	1.188
	1 1/8		2/DF240/9	2	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8			5	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8		PDFN240/9Y	5	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8		PDNF240/9GY	5G	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8		1/PDNF240/9G	5G	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8			6	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8		PDF240/9Y	6	29.44	1.159	-0.20	-0.008	80	3.1496	36.51	1.438
	1 1/8		DNF145/9Y	1	29.44	1.159	-0.20	-0.008	85	3.3465	30.16	1.188
	1 1/8		PDFN145/9Y	3	29.44	1.159	-0.20	-0.008	85	3.3465	30.16	1.188
	1 1/8		PDNF245/9Y	5	29.44	1.159	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/8		PDFN150/9Y	3	29.44	1.159	-0.20	-0.008	90	3.5433	30.16	1.188
	1 1/8		PDNF150/9GY	3G	29.44	1.159	-0.20	-0.008	90	3.5433	30.16	1.188
	1 1/8			4	29.44	1.159	-0.20	-0.008	90	3.5433	30.16	1.188
	1 1/8		PDF150/9GY	4G	29.44	1.159	-0.20	-0.008	90	3.5433	30.16	1.188
	1 1/8			5	29.44	1.159	-0.20	-0.008	90	3.5433	36.51	1.438
	1 1/8		PDFN250/9Y	5	29.44	1.159	-0.20	-0.008	90	3.5433	36.51	1.438
30			DNF240/9AY	1	30.94	1.218	-0.20	-0.008	80	3.1496	36.51	1.438
30			DNF240/9AGY	1G	30.94	1.218	-0.20	-0.008	80	3.1496	36.51	1.438
30			DNF145/9AY	1	30.94	1.218	-0.20	-0.008	85	3.3465	30.16	1.188
30				2	30.94	1.218	-0.20	-0.008	85	3.3465	36.51	1.438
30			DF245/9AY	2	30.94	1.218	-0.20	-0.008	85	3.3465	36.51	1.438
				5	30.94	1.218	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/4		PDFN245/9AY	5	30.94	1.218	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/4		DNF145/10Y	1	32.95	1.297	-0.20	-0.008	85	3.3465	30.16	1.188
	1 1/4		DNF245/10Y	1	32.95	1.297	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/4		DNF245/10GY	1G	32.95	1.297	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/4			5	32.95	1.297	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/4		PDNF245/10Y	5	32.95	1.297	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/4		PDFN145/10GY	3G	32.95	1.297	-0.20	-0.008	85	3.3465	30.16	1.188
	1 1/4			6	32.95	1.297	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/4		PDF245/10Y	6	32.95	1.297	-0.20	-0.008	85	3.3465	36.51	1.438
	1 1/4		DNF155/10Y	1	32.95	1.297	-0.20	-0.008	100	3.9370	33.34	1.312
	1 1/2		DNF155/12Y	1	39.12	1.540	-0.20	-0.008	100	3.9370	33.34	1.312
	1 1/2		DNF155/12GY	1G	39.12	1.540	-0.20	-0.008	100	3.9370	33.34	1.312
	1 1/2		PDNF155/12Y	3	39.12	1.540	-0.20	-0.008	100	3.9370	33.34	1.312
	1 1/2		PDNF155/12GY	3G	39.12	1.540	-0.20	-0.008	100	3.9370	33.34	1.312
	1 1/2			4	39.12	1.540	-0.20	-0.008	100	3.9370	33.34	1.312
	1 1/2		PDF155/12Y	4	39.12	1.540	-0.20	-0.008	100	3.9370	33.34	1.312
	1 1/2		PDF155/12GY	4G	39.12	1.540	-0.20	-0.008	100	3.9370	33.34	1.312
	1 1/2			5G	39.12	1.540	-0.20	-0.008	100	3.9370	50.80	2.000
40			PDNF11008	5G	39.12	1.540	-0.20	-0.008	100	3.9370	50.80	2.000
40			DNF155/12AGY	1G	41.20	1.622	-0.20	-0.008	100	3.9370	33.34	1.312
40				4	41.20	1.622	-0.20	-0.008	100	3.9370	33.34	1.312
40			PDF155/12AY	4	41.20	1.622	-0.20	-0.008	100	3.9370	33.34	1.312
40			PDNF155/12AY	3	41.20	1.622	-0.20	-0.008	100	3.9370	33.34	1.312



External dimensions						Load ratings				Speed limit	Weight	
C		C ₂		r		C _r		C _{or}				
mm	Inch	mm	Inch	mm	Inch	N	lbf	N	lbf	rpm	kg	lb
18.00	0.709	-	-	-	-	29,100	6,540	17,900	4,020	650	0.74	1.62
30.16	1.188	-	-	-	-	32,500	7,310	19,900	4,480	650	0.89	1.96
21.00	0.827	-	-	-	-	32,500	7,310	19,900	4,480	650	0.63	1.39
21.00	0.827	-	-	-	-	32,500	7,310	19,900	4,480	650	0.69	1.52
18.00	0.709	-	-	-	-	29,100	6,540	17,900	4,020	650	0.62	1.37
21.00	0.827	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.63	1.39
21.00	0.827	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.69	1.52
18.00	0.709	-	-	1.0	0.039	29,100	6,540	17,900	4,020	650	0.72	1.59
30.16	1.188	-	-	-	-	32,500	7,310	19,900	4,480	650	0.81	1.79
24.00	0.945	6.2	0.244	-	-	32,500	7,310	19,900	4,480	650	0.79	1.75
30.16	1.188	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.81	1.79
21.00	0.827	-	-	-	-	32,500	7,310	19,900	4,480	650	0.59	1.30
21.00	0.827	-	-	-	-	32,500	7,310	19,900	4,480	650	0.63	1.39
18.00	0.709	-	-	-	-	29,100	6,540	17,900	4,020	650	0.58	1.28
21.00	0.827	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.59	1.30
18.00	0.709	-	-	1.0	0.039	29,100	6,540	17,900	4,020	650	0.58	1.28
30.16	1.188	-	-	-	-	32,500	7,310	19,900	4,480	650	0.75	1.66
30.16	1.188	6.2	0.244	-	-	32,500	7,310	19,900	4,480	650	0.75	1.66
24.00	0.945	6.2	0.244	-	-	32,500	7,310	19,900	4,480	650	0.70	1.54
30.16	1.188	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.75	1.66
22.00	0.866	-	-	-	-	32,500	7,310	20,500	4,610	600	0.70	1.54
30.16	1.188	-	-	-	-	32,500	7,310	20,500	4,610	600	0.78	1.72
30.16	1.188	-	-	-	-	32,500	7,310	20,500	4,610	600	0.83	1.83
30.16	1.188	-	-	-	-	35,000	7,870	23,200	5,220	550	0.95	2.11
30.16	1.188	6.7	0.264	-	-	35,000	7,870	23,200	5,220	550	0.95	2.11
30.16	1.188	-	-	1.0	0.039	35,000	7,870	23,200	5,220	550	0.95	2.11
30.16	1.188	6.7	0.264	1.0	0.039	35,000	7,870	23,200	5,220	550	0.95	2.11
30.16	1.188	-	-	-	-	35,000	7,870	23,200	5,220	550	1.01	2.25
21.00	0.827	-	-	-	-	32,500	7,310	19,900	4,480	650	0.61	1.35
21.00	0.827	6.2	0.244	-	-	32,500	7,310	19,900	4,480	650	0.63	1.39
22.00	0.866	-	-	-	-	32,500	7,310	20,500	4,610	600	0.67	1.48
22.00	0.866	-	-	1.0	0.039	32,500	7,310	20,500	4,610	600	0.73	1.61
30.16	1.188	-	-	-	-	32,500	7,310	20,500	4,610	600	0.83	1.83
22.00	0.866	-	-	-	-	32,500	7,310	20,500	4,610	600	0.65	1.43
22.00	0.866	-	-	-	-	32,500	7,310	20,500	4,610	600	0.75	1.66
22.00	0.866	6.5	0.256	-	-	32,500	7,310	20,500	4,610	600	0.75	1.66
30.16	1.188	-	-	-	-	32,500	7,310	20,500	4,610	600	0.79	1.75
30.16	1.188	6.5	0.256	-	-	32,500	7,310	20,500	4,610	600	0.79	1.75
30.16	1.188	-	-	1.0	0.039	32,500	7,310	20,500	4,610	600	0.79	1.75
25.00	0.984	-	-	-	-	43,500	9,780	29,200	6,560	500	1.32	2.90
25.00	0.984	-	-	-	-	43,500	9,780	29,200	6,560	500	1.16	2.56
25.00	0.984	7.4	0.291	-	-	43,500	9,780	29,200	6,560	500	1.16	2.56
33.34	1.312	-	-	-	-	43,500	9,780	29,200	6,560	500	1.26	2.79
33.34	1.312	7.4	0.291	-	-	43,500	9,780	29,200	6,560	500	1.26	2.79
33.34	1.312	-	-	1.5	0.059	43,500	9,780	29,200	6,560	500	1.26	2.79
33.34	1.312	7.4	0.291	1.5	0.059	43,500	9,780	29,200	6,560	500	1.26	2.79
33.34	1.312	7.6	0.299	-	-	43,500	9,780	29,200	6,560	500	1.33	2.93
25.00	0.984	7.4	0.291	-	-	43,500	9,780	29,200	6,560	500	1.19	2.62
33.34	1.312	-	-	1.5	0.059	43,500	9,780	29,200	6,560	500	1.19	2.62
33.34	1.312	-	-	-	-	43,500	9,780	29,200	6,560	500	1.26	2.79

Disc harrow bearings for round shafts

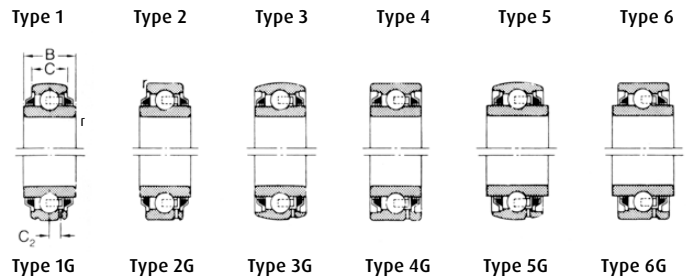
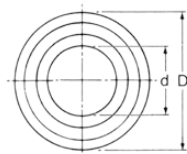
PDF and DNF series

PDF and DF series



Outer ring outside diameter tolerances			
Nominal outside diameter (D)		Tolerance	
over (mm)	incl. (mm)	in 0.001 mm	in 0.0001 inch
30	50	0 to -11	0 to -4
50	80	0 to -13	0 to -5
80	120	0 to -15	0 to -6

Shaft diameter		Reference No		Type	Bore dimensions				External dimensions			
		Spherical outer diameter	Cylindrical outer diameter		d		Tolerance		D		B	
mm	Inch				mm	Inch	mm	Inch	mm	Inch	mm	Inch
	1 $\frac{3}{16}$	2/DNF140-1.3/16		1	30.176	1.1880	-0.013	-0.0005	80	3.1496	30.16	1.188
	1 $\frac{3}{16}$	PDFNF140-1.3/16Y		3	30.176	1.1880	-0.013	-0.0005	80	3.1496	30.16	1.188
	1 $\frac{1}{4}$	DNF140-1.1/4Y		1	31.763	1.2505	-0.013	-0.0005	80	3.1496	30.16	1.188
	1 $\frac{1}{4}$		DF140-1.1/4Y	2	31.763	1.2505	-0.013	-0.0005	80	3.1496	30.16	1.188
	1 $\frac{1}{4}$	PDFNF140-1.1/4Y		3	31.763	1.2505	-0.013	-0.0005	80	3.1496	30.16	1.188
	1 $\frac{1}{4}$	DNF140-1.1/4GY		1G	31.763	1.2505	-0.013	-0.0005	80	3.1496	30.16	1.188
	1 $\frac{1}{2}$	DNF11004		1	38.113	1.5005	-0.013	-0.0005	80	3.1496	42.86	1.688
	1 $\frac{1}{2}$		36/DF140-1.1/2	2	38.113	1.5005	-0.013	-0.0005	80	3.1496	42.86	1.688
	1 $\frac{1}{2}$	PDFNF140-1.1/2Y		3	38.113	1.5005	-0.013	-0.0005	80	3.1496	30.16	1.188
	1 $\frac{1}{2}$	PDFNF11016		5	38.113	1.5005	-0.013	-0.0005	80	3.1496	42.86	1.688
	1 $\frac{1}{2}$	28/PDNF145-1.1/2		3	38.990	1.5350	-0.250	-0.0100	85	3.3465	30.16	1.188
	1 $\frac{1}{2}$	28/PDNF145-1.1/2G		3G	38.990	1.5350	-0.250	-0.0100	85	3.3465	30.16	1.188
40		DNF140-40GY		1G	40.000	1.5748	-0.013	-0.0005	80	3.1496	30.16	1.188
45		DNF145-45Y		1	45.000	1.7717	-0.013	-0.0005	85	3.3465	30.16	1.188
45		PDFNF145-45Y		3	45.000	1.7717	-0.013	-0.0005	85	3.3465	30.16	1.188
45		PDFNF145-45GY		3G	45.000	1.7717	-0.013	-0.0005	85	3.3465	30.16	1.188
45		DNF11006		1G	45.160	1.7780	-0.180	-0.0070	85	3.3465	36.51	1.438
	1 $\frac{3}{8}$	5/PDNF150-1.3/4		3	45.340	1.7850	-0.250	-0.0100	90	3.5433	30.16	1.188
	1 $\frac{5}{16}$	DNF150-1.15/16Y		1	49.225	1.9380	-0.013	-0.0005	90	3.5433	30.16	1.188
	1 $\frac{5}{16}$		DF150-1.15/16Y	2	49.225	1.9380	-0.013	-0.0005	90	3.5433	30.16	1.188
	1 $\frac{5}{16}$	PDFNF150-1.15/16Y		3	49.225	1.9380	-0.013	-0.0005	90	3.5433	30.16	1.188
	1 $\frac{5}{16}$	PDFNF150-1.15/16GY		3G	49.225	1.9380	-0.013	-0.0005	90	3.5433	30.16	1.188
	1 $\frac{5}{16}$		PDF150-1.15/16Y	4	49.225	1.9380	-0.013	-0.0005	90	3.5433	30.16	1.188
50		DNF150-50Y		1	50.000	1.9685	-0.013	-0.0005	90	3.5433	30.16	1.188
50		DNF155-50Y		1	50.000	1.9685	-0.013	-0.0005	100	3.9370	33.34	1.312
50		DNF155-50GY		1G	50.000	1.9685	-0.013	-0.0005	100	3.9370	33.34	1.312
	2 $\frac{3}{16}$	DNF155-2.3/16Y		1	55.578	2.1881	-0.015	-0.0006	100	3.9370	33.34	1.312
	2 $\frac{3}{16}$	PDFNF155-2.3/16Y		3	55.578	2.1881	-0.015	-0.0006	100	3.9370	33.34	1.312
	2 $\frac{3}{16}$	PDFNF155-2.3/16GY		3G	55.578	2.1881	-0.015	-0.0006	100	3.9370	33.34	1.312
	2 $\frac{3}{16}$		PDF155-2.3/16Y	4	55.578	2.1881	-0.015	-0.0006	100	3.9370	33.34	1.312
	2 $\frac{3}{16}$		PDF155-2.3/16GY	4G	55.578	2.1881	-0.015	-0.0006	100	3.9370	33.34	1.312



External dimensions						Load ratings				Speed limit	Weight	
C		C ₂		r		C _r		C _{or}				
mm	Inch	mm	Inch	mm	Inch	N	lbf	N	lbf	rpm	kg	lb
18.00	0.709	-	-	1.0	0.039	29,100	6,540	17,900	4,020	650	0.63	1.39
30.16	1.188	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.71	1.58
21.00	0.827	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.64	1.41
21.00	0.827	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.64	1.41
30.16	1.188	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.70	1.55
21.00	0.827	6.2	0.244	1.0	0.039	32,500	7,310	19,900	4,480	650	0.62	1.37
21.00	0.827	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.68	1.50
21.00	0.827	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.68	1.50
30.16	1.188	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.63	1.39
30.16	1.188	-	-	1.0	0.039	32,500	7,310	19,900	4,480	650	0.72	1.59
30.16	1.188	-	-	1.0	0.039	32,500	7,310	20,500	4,610	600	0.74	1.65
30.16	1.188	6.5	0.256	1.0	0.039	32,500	7,310	20,500	4,610	600	0.74	1.65
21.00	0.827	6.2	0.244	1.0	0.039	32,500	7,310	19,900	4,480	650	0.62	1.37
22.00	0.866	-	-	1.0	0.039	32,500	7,310	20,500	4,610	600	0.63	1.39
30.16	1.188	-	-	1.0	0.039	32,500	7,310	20,500	4,610	600	0.65	1.44
30.16	1.188	6.5	0.256	1.0	0.039	32,500	7,310	20,500	4,610	600	0.65	1.44
22.00	0.866	6.5	0.256	1.0	0.039	32,500	7,310	20,500	4,610	600	0.62	1.37
30.16	1.188	-	-	1.0	0.039	35,000	7,870	23,200	5,220	550	0.79	1.75
23.00	0.906	-	-	1.0	0.039	35,000	7,870	23,200	5,220	550	0.64	1.41
23.00	0.906	-	-	1.0	0.039	35,000	7,870	23,200	5,220	550	0.64	1.41
30.16	1.188	-	-	1.0	0.039	35,000	7,870	23,200	5,220	550	0.66	1.46
30.16	1.188	6.7	0.264	1.0	0.039	35,000	7,870	23,200	5,220	550	0.66	1.46
30.16	1.188	-	-	1.0	0.039	35,000	7,870	23,200	5,220	550	0.70	1.56
23.00	0.906	-	-	1.0	0.039	35,000	7,870	23,200	5,220	550	0.63	1.39
25.00	0.984	-	-	1.5	0.059	43,500	9,780	29,200	6,560	500	0.77	1.70
25.00	0.984	7.4	0.291	1.5	0.059	43,500	9,780	29,200	6,560	500	0.77	1.70
25.00	0.984	-	-	1.5	0.059	43,500	9,780	29,200	6,560	500	0.91	2.00
33.34	1.312	-	-	1.5	0.059	43,500	9,780	29,200	6,560	500	0.96	2.13
33.34	1.312	7.4	0.291	1.5	0.059	43,500	9,780	29,200	6,560	500	0.96	2.13
33.34	1.312	-	-	1.5	0.059	43,500	9,780	29,200	6,560	500	1.05	2.33
33.34	1.312	7.4	0.291	1.5	0.059	43,500	9,780	29,200	6,560	500	1.05	2.33

Bearings for powertrains/gears

NSK also offers tailored bearing solutions for powertrains and gears.

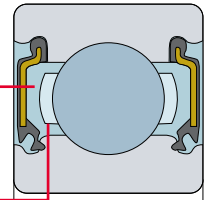


TM series – deep-groove ball bearings with a special seal

NSK's TM series is a range of deep-groove ball bearings which have been optimised for use with oil lubrication by adding special seals. The seal ensures that the oil flows through the bearing via a defined slit which prevents foreign bodies from entering the bearing

Features:

- › The seal stops dirt particles from getting into the bearing while allowing oil to enter
- › Less friction than with conventional contact seals
- › Sealed-in grease with a high affinity for gear oil to aid initial lubrication



Bearing series: The major dimensions are the same as for the standard deep-groove ball bearing series 62 and 63.



HR series – high-load deep-groove ball bearings

The HR series provides excellent performance in a wide range of applications.

Features:

- › Higher load ratings and longer lifetime
- › The major dimensions are identical to those of standard bearings
- › The ball diameter and quantity have been optimised

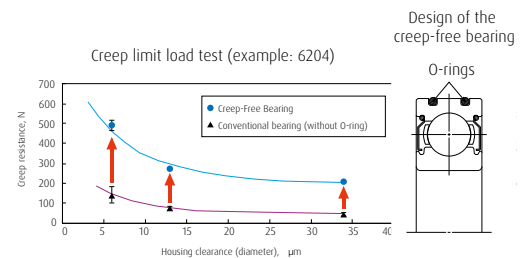


Creep-Free Bearing series

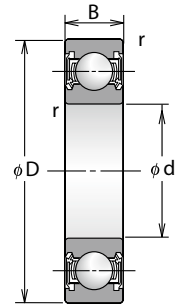
These bearings have two O-rings mounted in the outer ring to prevent creep.

Features:

- › O-ring stop the outer rings from creeping
- › Assembly is easy thanks to loose tolerance
- › Very little wear occurs on the bore surface of the housing, making reuse possible
- › The bearings can be used in existing housings because the dimensions are identical to those of standard bearings



TM Series - Deep groove ball bearing with special seal



Nomenclature

Example:

TM

205

C3

TM Series

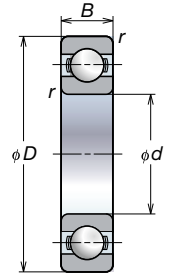
Basic number

Internal clearance

Dimensions (mm)			Load ratings (N)		Code
d	D	B	C _r	C _{0r}	
17	40	12	9,550	4,800	TM203
17	47	14	13,600	6,650	TM303
20	47	14	12,800	6,600	TM204
20	52	15	15,900	7,900	TM304
22	50	14	12,900	6,800	TM2/22
22	56	16	18,400	9,250	TM3/22
25	52	15	14,000	7,850	TM205
25	62	17	20,600	11,200	TM305
28	58	16	16,600	9,500	TM2/28
28	68	18	26,700	14,000	TM3/28
30	62	16	19,500	11,300	TM206
30	72	19	26,700	15,000	TM306
32	65	17	20,700	11,600	TM2/32
32	75	20	29,400	17,000	TM3/32
35	72	17	25,700	15,300	TM207
35	80	21	33,500	19,200	TM307
40	80	18	29,100	17,800	TM208
40	90	23	40,500	24,000	TM308
45	85	19	31,500	20,400	TM209
45	100	25	53,000	32,000	TM309
50	90	20	35,000	23,200	TM210
50	110	27	62,000	38,500	TM310
55	100	21	43,500	29,300	TM211
55	120	29	71,500	44,500	TM311
60	110	22	52,500	36,000	TM212
60	130	31	82,000	52,000	TM312
65	120	23	57,500	40,000	TM213
65	140	33	92,500	60,000	TM313
70	125	24	62,000	44,000	TM214
70	150	35	104,000	68,000	TM314

Note: The maximum continuous operating temperature for a standard nitrile rubber seal is 110 °C.

HR series – high-load deep-groove ball bearings



Nomenclature

Example: **HR** **6305** **C3**

High-load series ————|
 Basic number —————|
 Internal clearance —————|

NSK’s high-load deep-groove ball bearings (HR series) can significantly increase your application’s service life. This goes hand in hand with a substantial reduction in servicing and repair costs.

Product features

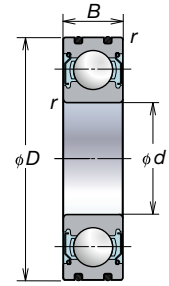
- › High load ratings (7% to 19% higher dynamic load ratings)
- › Optimised internal design
- › Pressed steel cage – larger rolling elements
- › Wide range of sizes available, including sealed units

Product benefits

- › Longer life (22% to 68% increase based on ISO L10 calculation)
- › Interchangeable with standard deep-groove ball bearings
- › Possible reduction in bearing size

d	Dimensions (mm)			r (min.)	Load ratings (N)		Code
	D	B			C _r	C _{or}	
15	35	11		0.6	8,550	3,950	HR 6202
15	42	13		1.0	13,300	5,900	HR 6302
17	40	12		0.6	11,300	5,350	HR 6203
17	47	14		1.0	15,600	7,100	HR 6303
20	52	15		1.1	18,200	9,050	HR 6304
25	52	15		1.0	15,300	8,100	HR 6205
25	62	17		1.1	23,700	12,200	HR 6305
30	62	16		1.0	23,300	12,800	HR 6206
30	72	19		1.1	29,800	15,800	HR 6306
35	72	17		1.1	28,300	16,000	HR 6207
35	80	21		1.5	39,500	21,500	HR 6307
40	80	18		1.1	32,500	19,900	HR 6208
40	90	23		1.5	47,000	28,200	HR 6308
45	85	19		1.1	36,500	22,600	HR 6209
45	100	25		1.5	57,000	34,500	HR 6309
50	90	20		1.1	39,000	25,800	HR 6210
50	110	27		2.0	66,500	40,500	HR 6310
55	100	21		1.5	48,000	32,000	HR 6211
55	120	29		2.0	78,000	46,000	HR 6311
60	110	22		1.5	58,000	38,000	HR 6212

Creep-Free series



Nomenclature

Example:

6205

CX

C3

Basic number

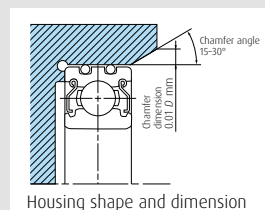
Creep-Free series

Internal clearance

Dimensions (mm)				Load ratings (N)		Code
d	D	B	r (min.)	C _r	C _{0r}	
10	26	8	0.3	4,550	1,970	6000CX
10	30	9	0.6	5,100	2,390	6200CX
10	35	11	0.6	8,100	3,450	6300CX
12	28	8	0.3	5,100	2,370	6001CX
12	32	10	0.6	6,800	3,050	6201CX
12	37	12	1.0	9,700	4,200	6301CX
15	32	9	0.3	5,600	2,830	6002CX
15	35	11	0.6	7,650	3,750	6202CX
15	42	13	1.0	11,400	5,450	6302CX
17	35	10	0.3	6,000	3,250	6003CX
17	40	12	0.6	9,550	4,800	6203CX
17	47	14	1.0	13,600	6,650	6303CX
20	42	12	0.6	9,400	5,000	6004CX
20	47	14	1.0	12,800	6,600	6204CX
20	52	15	1.1	15,900	7,900	6304CX
25	47	12	0.6	10,100	5,850	6005CX
25	52	15	1.0	14,000	7,850	6205CX
25	62	17	1.1	20,600	11,200	6305CX
30	55	13	1.0	13,200	8,300	6006CX
30	62	16	1.0	19,500	11,300	6206CX
30	72	19	1.1	26,700	15,000	6306CX
35	62	14	1.0	16,000	10,300	6007CX
35	72	17	1.1	25,700	15,300	6207CX
35	80	21	1.5	33,500	19,200	6307CX
40	68	15	1.0	16,800	11,500	6008CX
40	80	18	1.1	29,100	17,900	6208CX
40	90	23	1.5	40,500	24,000	6308CX
45	75	16	1.0	20,900	15,200	6009CX
45	85	19	1.1	31,500	20,400	6209CX
45	100	25	1.5	53,000	32,000	6309CX

Note on mounting Creep-Free bearings

- › When oil or grease is applied to the outer ring of the bearing, please use a mineral oil or a synthetic hydrocarbon oil (e.g. NSK's EA2)
- › Standard O-rings should only be used between -30 °C and 120 °C.
Please contact NSK for advice on other operating conditions



Note 1: Although recommended fits are G6 or H7, G6 is recommended when used in conditions that prioritise insertion under a light preload.

Seal technology

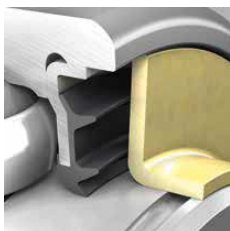
Designing suitable seals is one of the most fundamental challenges when it comes to developing bearings for agricultural machinery. The inside of the bearing needs reliable protection from dirt, plant remnants, fertilisers and moisture. The seals even have to withstand pressure washers.

Here are a few examples of different seal concepts:

Rating								
10	Very good	8	Good	6	Fairly good	4	Satisfactory	
9		7		5		3		2
							1	Not suitable



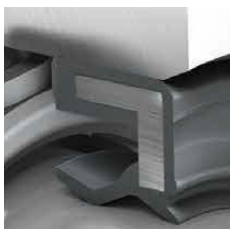
Cassette seal with a steel disc			
Protection from coarse dirt:	10	Bearing types:	Bearing units
Protection from dust:	10	Seal speed capability	4
Protection from water:	10	Applications:	Disc harrows, sowing machines
Grease retention:	10		



Triple-lip seal with a packing disc			
Protection from coarse dirt:	9	Bearing types:	Four-point bearings etc.
Protection from dust:	9	Seal speed capability	5
Protection from water:	9	Applications:	Sowing machines
Grease retention:	9		



Triple-lip seal with a flinger			
Protection from coarse dirt:	9	Bearing types:	Flanged bearing units
Protection from dust:	9	Seal speed capability	5
Protection from water:	9	Applications:	Tilling
Grease retention:	9		



Integrated radial shaft seal			
Protection from coarse dirt:	9	Bearing types:	Double-row bearings, rollers
Protection from dust:	9	Seal speed capability	8
Protection from water:	7	Applications:	Pressure rollers etc.
Grease retention:	7		



Triple-lip seal reinforced with sheet steel			
Protection from coarse dirt:	9	Bearing types:	Four-point bearings etc.
Protection from dust:	9	Seal speed capability	5
Protection from water:	9	Applications:	Sowing machines
Grease retention:	9		



Double-lip seal			
Protection from coarse dirt:	9	Bearing types:	Rollers etc.
Protection from dust:	7	Seal speed capability	7
Protection from water:	6	Applications:	Tilling
Grease retention:	7		



Single-lip seal with an adjacent flinger			
Protection from coarse dirt:	8	Bearing types:	Inserts
Protection from dust:	7	Seal speed capability	8
Protection from water:	7	Applications:	Mounted units
Grease retention:	6		



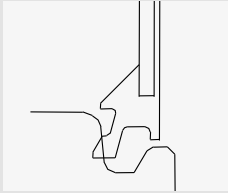
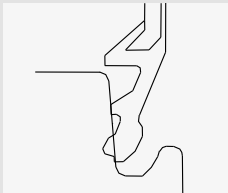
Single-lip seal			
Protection from coarse dirt:	8	Bearing types:	Inserts
Protection from dust:	7	Seal speed capability	8
Protection from water:	7	Applications:	Mounted units
Grease retention:	6		



Axial contact seal			
Protection from coarse dirt:	6	Bearing types:	Rollers etc.
Protection from dust:	7	Seal speed capability	9
Protection from water:	7	Applications:	Mounted units
Grease retention:	5		

Seal technology

Comparison of the DU standard seal with the optimised DG seal for deep-groove ball bearings

	<p>DU standard seal</p> <ul style="list-style-type: none"> › Dust resistance Good › Water resistance Good › Grease retention Good
	<p>Optimised DG seal</p> <ul style="list-style-type: none"> › Dust resistance Very good › Water resistance Very good › Grease retention Very good

Reference bearings for the comparative test: 6303DDU/6303DDG

Dust test

Test conditions: Speed: 4,500 min⁻¹
Temperature: 80 °C
Dust composition: JIS 3kind test*, 400 g

Result: The bearings with the DDG seal last more than twice as long as the bearings with DDU seals.

Average running time (in hours until temperature suddenly rises)

DDU	58	
DDG	133	

0 20 40 60 80 100 120 140

Water jet test

Test conditions: Speed: 2,000 min⁻¹
Amount of water: 1 l/min
Duration of test: 2 hours

Result: There was no indication of water ingress in the bearing with the DDG seal

Increase in weight (mg)

DDU	112	
DDG	0	

0 20 40 60 80 100 120 140

Bearing series currently available with an optimised DDG seal										
Serie	00	01	02	03	04	05	06	07	08	09
60				DDG	DDG	DDG	DDG			
62		DDG	DDG	DDG	DDG	DDG	DDG	DDG	DDG	
63			DDG	DDG	DDG	DDG	DDG	DDG		

* JIS 3kind test: quartz sand with an average grain size of 5 µm is stirred up in a box. The bearing rotates at a speed of 4,500 min⁻¹ in this box.

Other bearings for agricultural applications



Bearings

Deep groove ball bearings, cylindrical roller bearings, tapered roller bearings and spherical roller bearings in ISO standard dimensions for various applications



Double-row standard ball bearings and special ball bearings

Standard ball bearings, modified to suit or special solutions designed from new



Ball bearing units

Cast iron, pressed steel and polymer housings in various designs to ISO and JIS standards, with bearing inserts to suit

Increasing efficiency – with AIP, the value-added programme from NSK

Incorrectly applied or selected bearings can lead to anything from a reduction in machine performance to failure of an entire system. We support you in solving these technical problems. The value-added programme AIP incorporates a comprehensive service package which enables you to design both productive operation and maintenance processes with increased efficiency and consequently better profitability. With AIP, you reduce your costs at every value-added stage.

Concentrated knowledge, many years of experience

Thanks to their in-depth technical knowledge and industry know-how, the experienced NSK application engineers are able to identify profitability potential and recommend appropriate measures. Our experts work according to a procedure which has been tested in practice and standardised – the value cycle. The ideally coordinated solution for your application is developed in close cooperation with them.

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The comprehensive range of AIP services is purposely designed to enhance efficiency and competitiveness. Your NSK expert will advise you about which measures can be derived from the examination results and will support you in implementing them. An app developed specially by NSK helps to collect data quickly on site and to perform calculations. Another app presents success stories from various branches of industry.



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Example success stories show how profitability and reliability can be increased using tried and tested practices.

Cost Saver App

The cost savings calculator app enables potential cost savings to be calculated rapidly.



- › Stores Survey
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- › Process Map
- › Bearing Cross Referencing



- › Application Reviews
- › Machine Design Support
- › OEM Part Conversion
- › Diagnostics



- › Product Training
- › Application of NSK Bearings
- › AIP Training
- › Industry Specific Training



- › Bearing Condition Analysis
- › Failed Bearing Analysis
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