

NSK

HIGH PERFORMANCE AGRI DISC HUB BEARINGS FOR TILLAGE APPLICATIONS



A GLOBAL PARTNER AND SOLUTIONS PROVIDER

As a leading manufacturer of rolling bearings and linear technology components, NSK can be found on almost every continent – with production facilities, sales offices and technology centers - providing our customers with responsive design and decision-making, effective logistics and dedicated local service.



THE NSK COMPANY

NSK commenced operations as the first Japanese manufacturer of rolling bearings in 1916. From the outset, 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 the Americas, Europe, 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 optimization of quality – at every process stage.

At the core of our research activities is the development of advanced material and lubricant technologies, simulation applications using a variety of analytical systems, and technological innovation in the field of mechatronics.

	THE AMERICAS	EUROPE / AFRICA	ASIA / OCEANIA
Manufacturing Sites	10	9	45
Sales Locations	20	15	82
Technology Centers	2	3	10

As of January 2019

TRUSTED SOLUTIONS FOR TILLAGE EQUIPMENT

Global crop production is projected to expand through 2027-2028. Production expansion is driven by rising acreage and increasing yields. Therefore, farmers are finding ways to boost productivity with the use of high performance tillage equipment to prepare the seedbed. Knowing that agricultural applications present considerable challenges for all mechanical components, NSK R&D began developing high performance Agri Disc Hub solutions.

CRITICAL DESIGN CONSIDERATIONS

- › Contamination prevention: Excellent sealing capability
- › Maintenance-free: Lubricated for life
- › Robust design: Strong housing/high moment load and speed capability
- › Quick change out/less downtime: Easy installation
- › Extended bearing life: Long life automotive grease



NSK AGRI DISC HUB MANUFACTURING SITE

Established in 1954, the NSK Neuweg Germany production site is the primary location for innovative agri disc hub solutions. The Neuweg plant is highly flexible in developing customized applications, in addition to offering a wide range of standard products.

AGRI DISC HUB DESIGN

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 specifically for this use (**Figure 1**). This seal has successfully withstood extensive testing and can even handle tough operating conditions like the use of slurry fertilizer.

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 protected by a 2nd cassette or a DDU seal. This stops 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 RANGE AND NOMENCLATURE

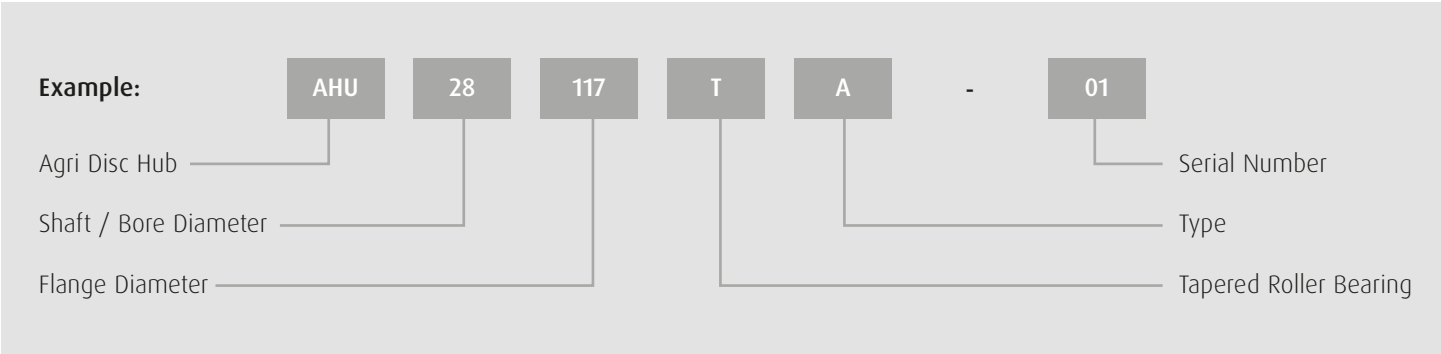
Since NSK developed our first Agri-Disc Hub in 2010, we have introduced more than 35 different part numbers. The agri disc hub sizes are designed for disc diameters of up to 1,000mm in various flanged and shaft types. The product range is constantly being expanded in close collaboration with our customers.

AGRI HUB PRODUCT RANGE



Featured products available for order. Please contact your NSK representative for additional information or to schedule a technical presentation.

NOMENCLATURE



NSK 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 specialities 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 unnecessary.	Defect analyses, repairs, guarantee

FOR FARMERS

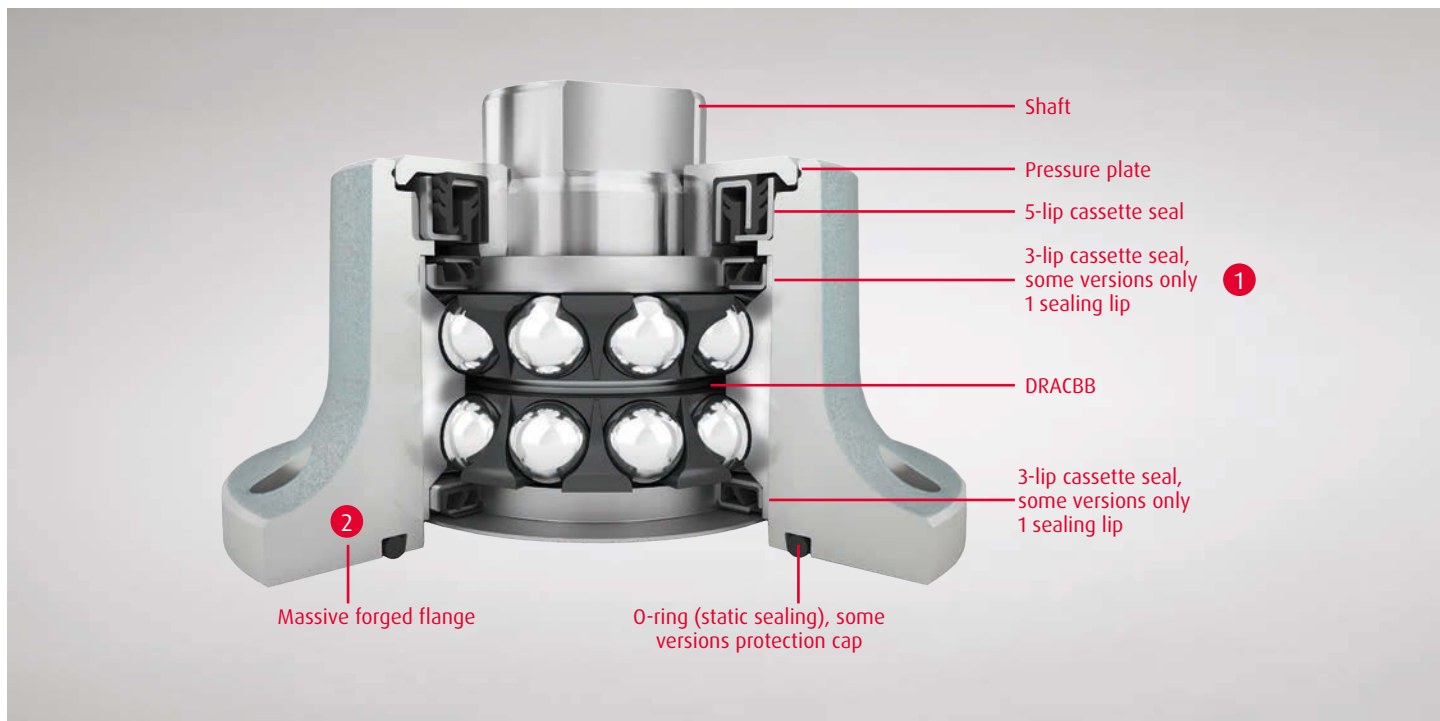
Factor	Description	Savings
Productivity	No need for repairs due to bearing failures caused by insufficient lubrication and contamination. This increases the machinery's availability.	Downtime, spare parts, repair service
Contamination	Field tests have proved that the cassette seal developed specially for the NSK Agri Disc Hubs provides reliable protection from contamination such as clay, sand, dust, plant fibers, slurry and other fertilizers, 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.

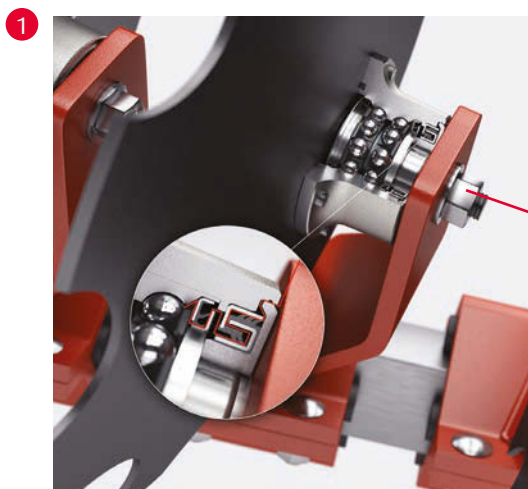
COMPARED TO DISC GANGS

- › Better rock tolerance: individual suspension for each disc
- › More compact frames: more consistent cultivation in turns
- › Capability for compound disc angles: soil can be lifted rather than just pushed side to side

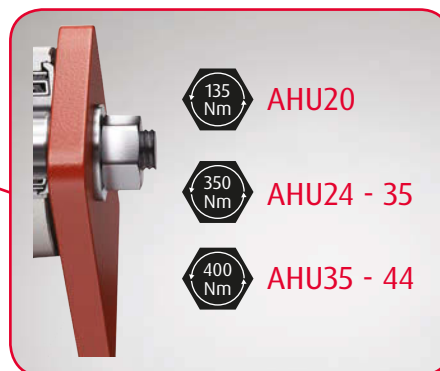
NSK SUPERIOR DESIGN



- (1) Unique labyrinth sealing system, 11 seal lips to keep contaminant out and grease in. Field proven since 2010, no hubs replaced
- (2) Thicker housing to protect seals against rock damage - improved reliability
- (3) 35% higher moment load capability (ball size, quantity, PCD, contact angle) - able to handle more disc depth and speed
- (4) Long-life RA1 grease - 4x longer than lithium grease - longer bearing life



WEDGE LOCK WASHER INSTALLATION



NSK AHU28117A-01 VS. COMPETITOR AGRI HUB

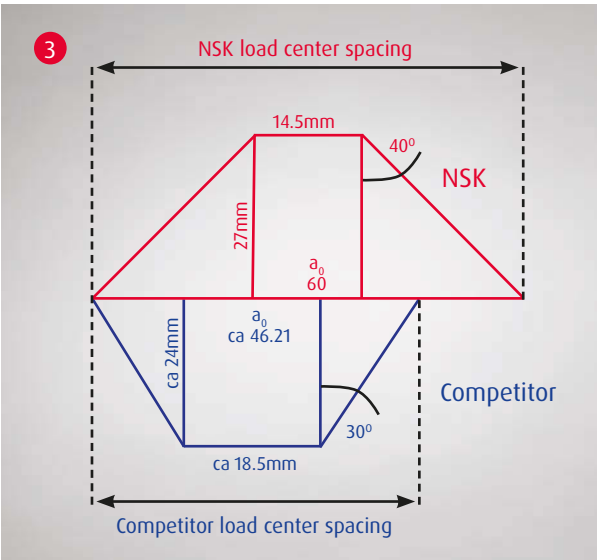


NSK



COMPETITOR

LOAD CENTER SPACING



Larger load center capacity equates to more moment load capacity.

OVERVIEW OF TECHNICAL DATA
NSK AHU28117A-01 VS. COMPETITOR AGRI HUB

	NSK	Competitor
Cr dynamic (radial)	46.0 kN	47.5 kN
Cor static (radial)	39.5 kN	37.5 kN
Contact angle	40°	30°
Bore diameter bearing	37mm	30mm
Ball quantity	14 x 2 row	12 x 2 row
Resulting Ca dynamic (axial)	≈50.0 kN	≈39.5 kN
Resulting Coa static (axial)	≈76.5 kN	≈57.5 kN
Sealing shaft side	5 cassette seal	5 cassette seal
Sealing inner bearing	Both sides automotive seal	One side RS seal
Grease	RA1 long life automotive grease	Mineral oil + Li soap

EXAMINATION FOLLOWING FIELD TESTING

CONDITIONS:

Rocky Soil
USA



NSK Agri hub after over 4,500 acres of use - no external damage.



NSK hub flange side with O-ring seal.



Clean grease on cartridge seal - no signs of dirt past 2nd lip seal.



Ample amount of clean grease on bearing balls and cage - no dirt or grease contamination.



Grease samples were taken from seal lips for analysis.



Raceways are in like-new condition.

RESULT OF THE EXAMINATION:

Upon closer inspection, no dirt was found past the 2nd lip seal. On the flange side, dirt and moisture did not make it past the O-ring seal. The overall bearing condition demonstrates that it was capable of handling all loading applied even in rocky conditions.

CONDITIONS:

Slurry fertilizer

Europe



Typical picture of a compact disc harrow covered in dirt following the use of slurry fertilizer.



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.

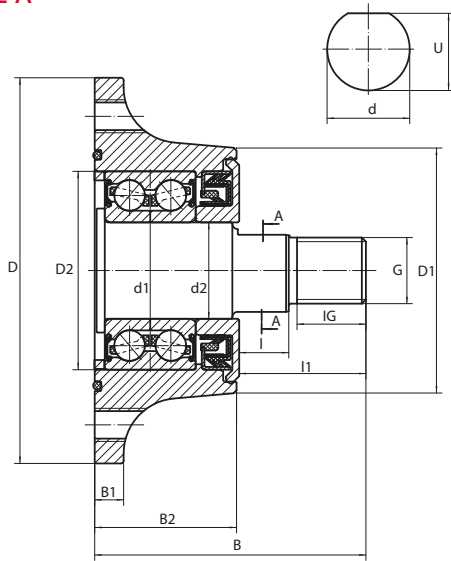
RESULT OF THE EXAMINATION:

Although the Agri Disc Hub bearing unit was used in extreme operating conditions in a compact disc harrow incorporating slurry fertilizer, 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.

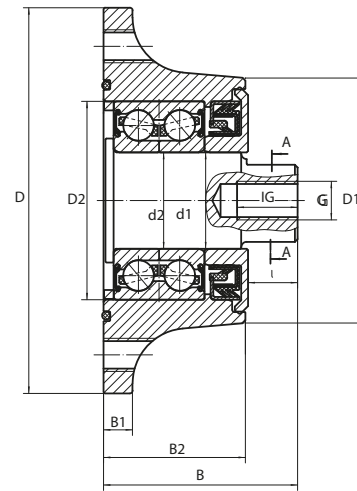
*Field test 3.000ha

DIMENSION TABLE

TYPE A

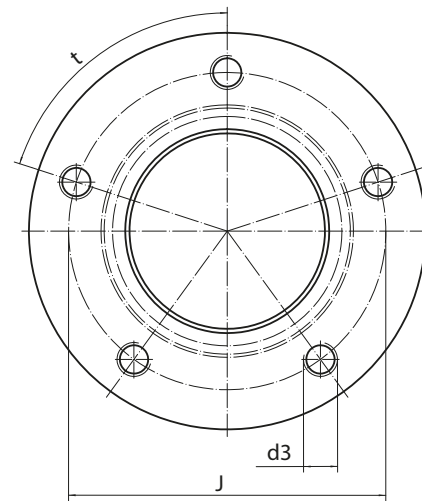
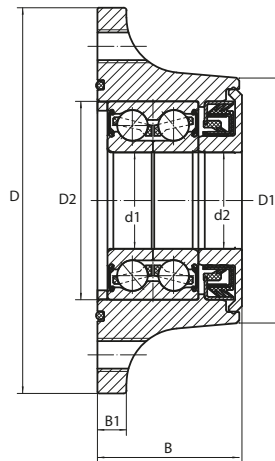


TYPE B



NSK Ref No.	d	D	D1	D2	J (mm)	J (in)	d1	d2	d3	t
AHU17085C-01	-	85	50	40	65	2.56	17	40	6,3	6 x 60°
AHU20091C-01	-	91	57	47	75	2.95	20	47	6,8	6 x 60°
AHU20091C-02	-	91	57	47	75	2.95	20	47	6,8	6 x 60°
AHU20100A-01	20	100	60	47	80	3.15	20	20	M10 x 1	5 x 72°
AHU20100B-01	20	100	60	47	80	3.15	20	20	M10 x 1	5 x 72°
AHU20120A-01	20	120	60	47	100	3.94	20	20	M10 x 1.5	6 x 60°
AHU20120B-01	20	120	60	47	100	3.94	20	20	M10 x 1.5	6 x 60°
AHU24135A-01	24	135	89	72	110	4.33	35	35	M12 x 1.75	4 x 90°
AHU28117A-01	28	117	89	72	98	3.86	37	35	M12 x 1.25	4 x 90°
AHU28117A-02	28	117	89	72	98	3.86	37	35	M12 x 1.25	5 x 72°
AHU28117A-03	28	117	89	72	98	3.86	37	35	M12 x 1.25	6 x 60°
AHU28117A-01	28	117	89	72	98	3.86	37	35	13	4 x 90°
AHU28140A-01	28	140	89	72	107.95	4.25	35	35	M12 x 1.25	5 x 72°
AHU30117A-01	30	117	89	72	98	3.86	37	35	M12 x 1.25	4 x 90°
AHU30140A-01	30	140	89	72	112	4.41	35	35	M12 x 1.5	5 x 72°
AHU34120B-01	34	120	89	72	100	3.94	35	35	M10 x 1.5	6 x 60°
AHU34140B-01	34	140	89	72	120	4.72	35	35	M10 x 1	4 x 90°
AHU34140B-02	34	140	75	72	120	4.72	35	35	M10 x 1	4 x 90°
AHU35169B-02	35	169	83	98	139.7	5.50	45	45	13,487	5 x 72°
AHU44140B-01	44	140	100	83	122	4.80	45	45	M12 x 1.75	6 x 60°
AHU45175B-01	45	175	100	83	133.35	5.25	45	45	12,7	5 x 72°
AHU45175TB-01	45	175	100	82	133.35	5.25	45	45	12,7	5 x 72°

TYPE C



Unit: mm

U	I	I1	B	B1	B2	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	22,5	up to 500mm	A	135 Nm
18,5	9	-	47,0	7,0	38,0	20,0	up to 500mm	B	135 Nm
18,5	35	10,5	73,0	8,0	38,0	22,5	up to 500mm	A	135 Nm
18,5	9	-	47,0	8,0	38,0	20,0	up to 500mm	B	135 Nm
22,7	55	19,0	132,0	11,0	77,0	36,0	up to 700mm	A	350 Nm
25,5	42	13,0	102,0	10,5	60,0	25,0	up to 700mm	A	350 Nm
25,5	42	13,0	102,0	10,5	60,0	25,0	up to 700mm	A	350 Nm
25,5	42	13,0	102,0	10,5	60,0	25,0	up to 700mm	A	350 Nm
25,5	42	13,0	102,0	10,5	60,0	25,0	up to 700mm	A	350 Nm
25,5	42	13,0	94,5	10,5	52,5	25,0	up to 700mm	A	350 Nm
27,5	46	13,0	106,0	10,5	60,0	25,0	up to 700mm	A	350 Nm
28,0	46	18,0	98,5	10,5	52,5	25,0	up to 700mm	A	350 Nm
31,0	14	-	66,5	13,0	52,5	26,0	up to 700mm	B	350 Nm
31,0	19	-	71,5	10,5	52,5	26,0	up to 700mm	B	350 Nm
31,0	19	-	101,5	10,5	82,5	26,0	up to 700mm	B	350 Nm
31,0	15	15,0	81,4,0	14,0	67,0	-	up to 800mm	B	350 Nm
40,0	14	-	79,8	10,0	65,8	26,0	up to 800mm	B	400 Nm
41,0	37	-	103,8	14,0	66,8	40,0	up to 800mm	B	400 Nm
41,0	37	-	103,8	14,0	66,8	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.

OTHER BEARINGS FOR AGRICULTURAL MACHINERY 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 customized ball bearings

Standard ball bearings and modified or customized solutions



Ball bearing units

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



J-line units

NSK newly launched (April 2019) bearing units made to the JIS standard



Gauge wheel bearings

Extra wide double-row angular contact ball bearing



Seeding disc bearing

Features single lip seal on one side and a gaiter lip seal on the other side



Four point contact bearing

Features an extended inner ring, various special seals and a flinger on one side



Seeding hub

Maintenance-free seeding hub features 3 lip seals and a high end radial shaft seal with dust cover



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