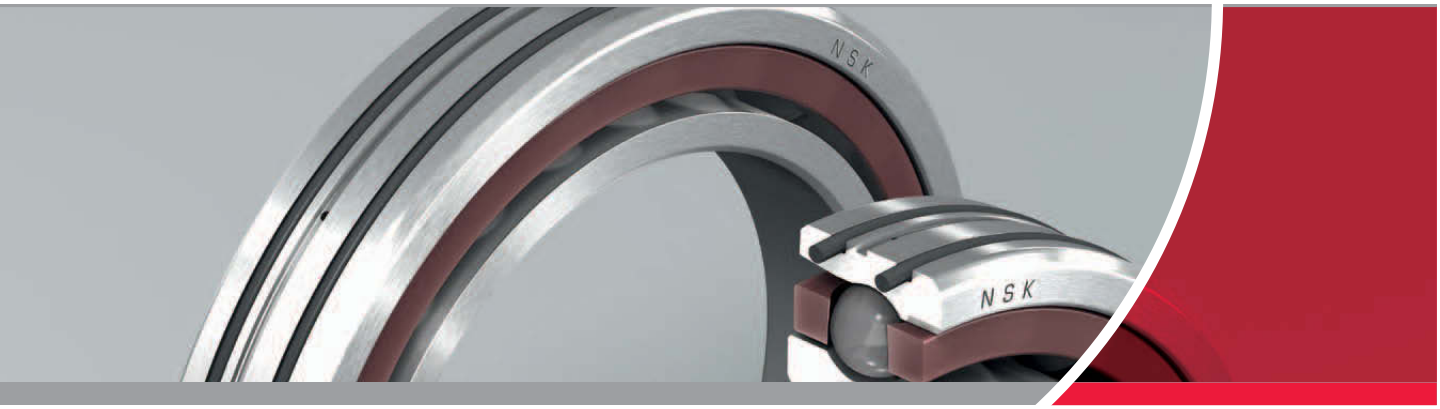
NSK

HIGH-PRECISION ANGULAR-CONTACT BALL BEARINGS

ROBUSTSHOT SERIES

High-precision angular-contact ball bearings

Picture Courtesy: Franz Kessler GmbH, Germany



The requirements for the main spindles on modern machine tools continue to increase. For this reason, growing demands are also being made of the spindle bearings. A reliable, continuous supply of lubrication to the working surfaces of the bearing is a particular challenge; without this lubrication, bearing operation would be impossible.

The newly developed NSK angular-contact ball bearings in the ROBUSTSHOT series meet all of these requirements. Conventional oil-air lubrication methods attempt to inject the lubricant into the bearing from the side using a nozzle. The problem here, however, is the air vortex generated around the bearing by rotating parts such as the cage and the balls. The injection speed must be significantly higher than that of the air vortex for the lubricating oil to make it into the bearing at all.

The ROBUSTSHOT series of bearings avoids this problem completely. The lubricating oil is routed straight to a point right by the working surfaces on the outer ring via a circular groove and a through-hole in the outer ring. This guarantees a reliable, even supply of lubricant, enabling rotational speeds of over 3 million $d_m n$.

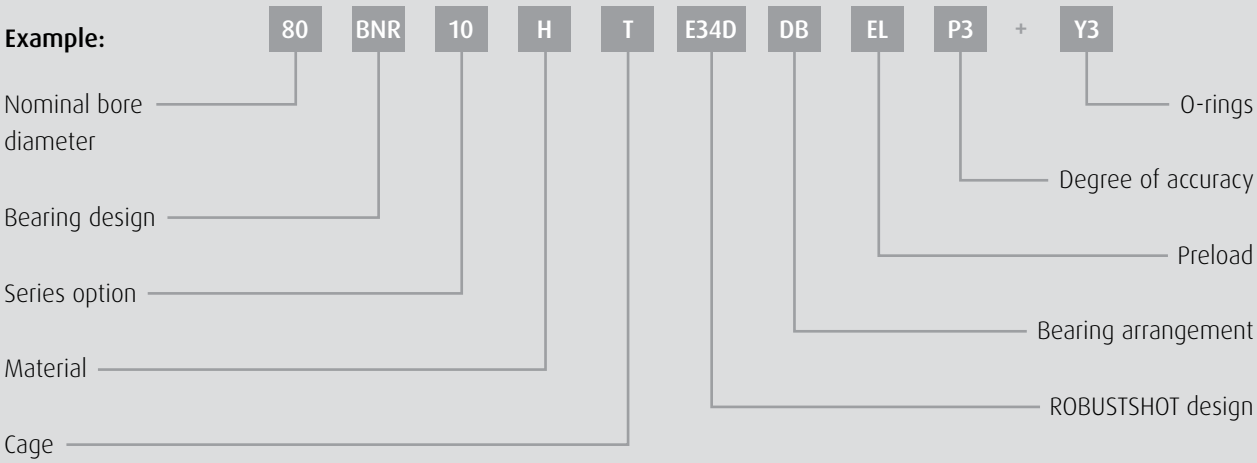
In addition, two O-rings in the outer ring ensure that the through-hole in the housing is securely sealed. This means that any fit can be selected, depending on the application. Because there are no injection nozzles between the bearings, very compact spindles can be designed. As the ROBUSTSHOT angular-contact ball bearings have the same dimensions as grease-lubricated bearings, it is easier to use spindle components as modules for various spindle series. From a spindle manufacturer's perspective, this increases cost-effectiveness.

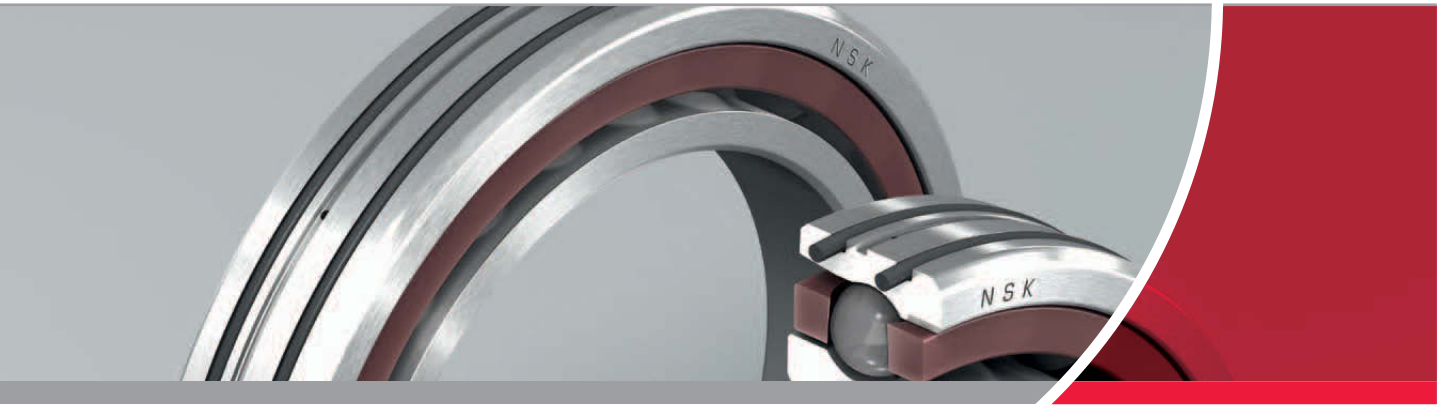
Likewise, the dimensions of the bearings in the ROBUSTSHOT series correspond with DIN ISO standards. They are also the same size as conventional bearings, which makes it easy to retrofit NSK bearings into existing designs.

High-precision angular-contact ball bearings

Nomenclature for angular-contact bearings with oil-air lubrication (ROBUSTSHOT series)

Nomenclature system

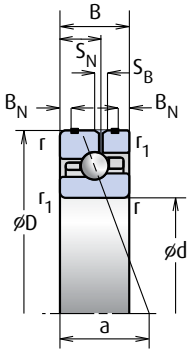




Code	Definition	Application example
80	Nominal bore diameter	Bore diameter (mm)
BNR	Bearing design	BNR: Contact angle 18° BER: Contact angle 25°
10	Series option	10 = ISO series 10, 19 = ISO series 19
H	Material	Rings: Bearing steel (SUJ2) Rolling elements: Ceramic (Si_3N_4)
T	Cage	T: Phenolic cage guided by the outer ring Max. operating temperature 120 °C
E34D	ROBUSTSHOT design seal	E34D: Lubrication groove with 2 oil through-holes and 2 grooves on the outer ring for the O-ring
DB	Arrangement	SU: Universal design (single row) DU: Universal design (double row) DB: Back to back arrangemet (O-arrangement) DF: Face to face (X-arrangement) DT: Tandem arrangement DBD, DFD, DTD, DUD: Triplex sets DBB, DFF, DBT, DFT, DTT, QU: Quadruplex sets
EL	Preload	EL: Extra light preload L: Light preload M: Medium preload
P3	Degree of accuracy	P2: ISO class 2 P3: NSK standard (dimension accuracy according to ISO class 4, running accuracy according to ISO class 2) P2F: NSK standard (through-hole and outside diameter according to NSK specifications. All other dimensions according to ISO class 2)
Y3	O-rings	Y3: 2 O-rings mounted on the outer ring

High-precision angular-contact ball bearings
Size option 19

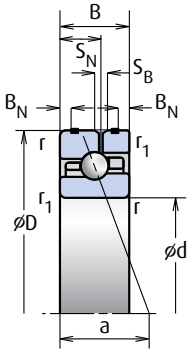
Code	Main dimensions								
	d	D	B	BN	SN	SB	r (min.)	r_1 (min.)	
30BNR19H	30	47	9	1.1	5.6	1.4	0.3	0.15	
30BER19H	30	47	9	1.1	5.6	1.4	0.3	0.15	
35BNR19H	35	55	10	1.6	6.1	1.4	0.6	0.30	
35BER19H	35	55	10	1.6	6.1	1.4	0.6	0.30	
40BNR19H	40	62	12	2.2	7.0	1.4	0.6	0.30	
40BER19H	40	62	12	2.2	7.0	1.4	0.6	0.30	
45BNR19H	45	68	12	2.2	7.0	1.4	0.6	0.30	
45BER19H	45	68	12	2.2	7.0	1.4	0.6	0.30	
50BNR19H	50	72	12	2.2	7.0	1.4	0.6	0.30	
50BER19H	50	72	12	2.2	7.0	1.4	0.6	0.30	
55BNR19H	55	80	13	2.8	7.5	1.4	1.0	0.60	
55BER19H	55	80	13	2.8	7.5	1.4	1.0	0.60	
60BNR19H	60	85	13	2.8	7.5	1.4	1.0	0.60	
60BER19H	60	85	13	2.8	7.5	1.4	1.0	0.60	
65BNR19H	65	90	13	2.8	7.5	1.4	1.0	0.60	
65BER19H	65	90	13	2.8	7.5	1.4	1.0	0.60	
70BNR19H	70	100	16	3.1	9.3	1.4	1.0	0.60	
70BER19H	70	100	16	3.1	9.3	1.4	1.0	0.60	
75BNR19H	75	105	16	3.1	9.3	1.4	1.0	0.60	
75BER19H	75	105	16	3.1	9.3	1.4	1.0	0.60	
80BNR19H	80	110	16	3.1	9.3	1.4	1.0	0.60	
80BER19H	80	110	16	3.1	9.3	1.4	1.0	0.60	
85BNR19H	85	120	18	4.0	10.4	2.2	1.1	0.60	
85BER19H	85	120	18	4.0	10.4	2.2	1.1	0.60	
90BNR19H	90	125	18	4.0	10.4	2.2	1.1	0.60	
90BER19H	90	125	18	4.0	10.4	2.2	1.1	0.60	
95BNR19H	95	130	18	4.0	10.4	2.2	1.1	0.60	
95BER19H	95	130	18	4.0	10.4	2.2	1.1	0.60	
100BNR19H	100	140	20	4.0	12.0	2.2	1.1	0.60	
100BER19H	100	140	20	4.0	12.0	2.2	1.1	0.60	
110BNR19H	110	150	20	4.0	12.0	2.2	1.1	0.60	
110BER19H	110	150	20	4.0	12.0	2.2	1.1	0.60	



	Code	Load rating (kN)		Permissible axial load (kN)	Effective load centre (mm) a	Weight (kg) (approx.)	Speed limit (min^{-1})
		Cr (dyn.)	COr (stat.)				Oil
	30BNR19H	6.30	4.05	3.80	10.8	0.043	72,800
	30BER19H	6.00	3.90	4.60	13.5	0.043	65,000
	35BNR19H	9.20	6.00	5.60	12.3	0.063	62,300
	35BER19H	8.80	5.75	6.80	15.5	0.063	55,600
	40BNR19H	11.50	7.65	7.10	14.3	0.092	55,000
	40BER19H	11.00	7.35	8.65	17.9	0.092	49,100
	45BNR19H	12.10	8.70	8.10	15.2	0.111	49,600
	45BER19H	11.60	8.35	9.85	19.2	0.111	44,300
	50BNR19H	12.80	9.75	9.10	15.9	0.111	46,000
	50BER19H	12.30	9.35	11.00	20.2	0.111	41,000
	55BNR19H	14.40	11.40	10.60	17.5	0.158	41,500
	55BER19H	13.80	10.90	12.90	22.2	0.158	37,100
	60BNR19H	14.60	12.00	11.20	18.3	0.170	38,700
	60BER19H	14.00	11.50	13.60	23.4	0.170	34,500
	65BNR19H	15.20	13.20	12.30	19.1	0.181	36,200
	65BER19H	14.50	12.60	14.90	24.6	0.181	32,300
	70BNR19H	21.30	18.10	17.10	21.8	0.292	33,000
	70BER19H	20.40	17.30	20.70	27.8	0.292	29,500
	75BNR19H	21.60	19.00	18.00	22.6	0.310	31,200
	75BER19H	20.70	18.20	21.70	29.0	0.310	27,800
	80BNR19H	22.00	19.90	18.90	23.4	0.326	29,500
	80BER19H	21.00	19.10	22.80	30.1	0.326	26,400
	85BNR19H	29.40	26.30	24.80	25.7	0.456	27,400
	85BER19H	28.10	25.20	30.00	32.9	0.456	24,400
	90BNR19H	31.50	29.70	28.10	26.5	0.480	26,100
	90BER19H	30.00	28.50	34.00	34.1	0.480	23,300
	95BNR19H	32.00	31.00	32.50	28.3	0.497	24,900
	95BER19H	30.50	29.70	39.50	36.7	0.497	22,300
	100BNR19H	38.00	35.00	33.00	29.5	0.673	23,400
	100BER19H	36.00	33.50	40.00	38.0	0.673	20,900
	110BNR19H	39.00	38.00	42.00	31.1	0.733	21,600
	110BER19H	37.50	36.50	44.00	40.3	0.733	19,300

High-precision angular-contact ball bearings
Size option 10

Code	Main dimensions								
	d	D	B	BN	SN	SB	r (min.)	r_1 (min.)	
30BNR10H	30	55	13	2.8	7.5	1.4	1.0	0.6	
30BER10H	30	55	13	2.8	7.5	1.4	1.0	0.6	
35BNR10H	35	62	14	2.8	8.3	1.4	1.0	0.6	
35BER10H	35	62	14	2.8	8.3	1.4	1.0	0.6	
40BNR10H	40	68	15	2.8	8.8	1.4	1.0	0.6	
40BER10H	40	68	15	2.8	8.8	1.4	1.0	0.6	
45BNR10H	45	75	16	3.4	9.3	1.4	1.0	0.6	
45BER10H	45	75	16	3.4	9.3	1.4	1.0	0.6	
50BNR10H	50	80	16	3.4	9.3	1.4	1.0	0.6	
50BER10H	50	80	16	3.4	9.3	1.4	1.0	0.6	
55BNR10H	55	90	18	4.3	10.0	1.4	1.1	0.6	
55BER10H	55	90	18	4.3	10.0	1.4	1.1	0.6	
60BNR10H	60	95	18	4.3	10.0	1.4	1.1	0.6	
60BER10H	60	95	18	4.3	10.0	1.4	1.1	0.6	
65BNR10H	65	100	18	4.0	10.4	1.4	1.1	0.6	
65BER10H	65	100	18	4.0	10.4	1.4	1.1	0.6	
70BNR10H	70	110	20	4.0	11.6	1.4	1.1	0.6	
70BER10H	70	110	20	4.0	11.6	1.4	1.1	0.6	
75BNR10H	75	115	20	4.0	11.6	1.4	1.1	0.6	
75BER10H	75	115	20	4.0	11.6	1.4	1.1	0.6	
80BNR10H	80	125	22	4.7	12.2	2.2	1.1	0.6	
80BER10H	80	125	22	4.7	12.2	2.2	1.1	0.6	
85BNR10H	85	130	22	4.7	12.2	2.2	1.1	0.6	
85BER10H	85	130	22	4.7	12.2	2.2	1.1	0.6	
90BNR10H	90	140	24	5.5	14.5	2.2	1.5	1.0	
90BER10H	90	140	24	5.5	14.5	2.2	1.5	1.0	
95BNR10H	95	145	24	5.5	14.5	2.2	1.5	1.0	
95BER10H	95	145	24	5.5	14.5	2.2	1.5	1.0	
100BNR10H	100	150	24	5.5	14.5	2.2	1.5	1.0	
100BER10H	100	150	24	5.5	14.5	2.2	1.5	1.0	
105BNR10H	105	160	26	6.0	15.2	2.2	2.0	1.0	
105BER10H	105	160	26	6.0	15.2	2.2	2.0	1.0	
110BNR10H	110	170	28	6.0	16.2	2.2	2.0	1.0	
110BER10H	110	170	28	6.0	16.2	2.2	2.0	1.0	
120BNR10H	120	180	28	6.0	16.2	2.2	2.0	1.0	
120BER10H	120	180	28	6.0	16.2	2.2	2.0	1.0	



	Code	Load rating (kN)		Permissible axial load (kN)	Effective load centre (mm) a	Weight (kg) (approx.)	Speed limit (min^{-1})
		Cr (dyn.)	COr (stat.)				Oil
	30BNR10H	8.65	5.75	5.35	13.3	0.116	65,900
	30BER10H	8.30	5.50	6.50	16.3	0.116	58,900
	35BNR10H	10.10	7.10	6.70	14.8	0.154	57,800
	35BER10H	9.70	6.85	8.10	18.2	0.154	51,600
	40BNR10H	10.60	7.95	7.50	16.2	0.193	51,900
	40BER10H	10.10	7.65	9.10	19.9	0.193	46,300
	45BNR10H	11.70	9.00	8.35	17.6	0.246	46,700
	45BER10H	11.20	8.60	10.10	21.8	0.246	41,700
	50BNR10H	12.20	9.90	9.20	18.4	0.266	43,100
	50BER10H	11.60	9.50	11.10	23.0	0.266	38,500
	55BNR10H	15.10	12.50	11.70	20.6	0.393	38,700
	55BER10H	14.40	12.00	14.10	25.7	0.393	34,500
	60BNR10H	15.60	13.70	12.80	21.5	0.419	36,200
	60BER10H	15.00	13.10	15.50	26.9	0.419	32,300
	65BNR10H	16.20	14.80	13.90	22.3	0.447	34,000
	65BER10H	15.50	14.20	16.80	28.0	0.447	30,400
	70BNR10H	22.30	19.80	18.80	24.5	0.605	31,200
	70BER10H	21.30	18.90	22.60	30.8	0.605	27,800
	75BNR10H	22.60	20.70	19.70	25.3	0.638	29,500
	75BER10H	21.60	19.80	23.70	31.9	0.638	26,400
	80BNR10H	26.50	24.50	23.40	27.5	0.867	27,400
	80BER10H	25.30	23.50	28.20	34.6	0.867	24,400
	85BNR10H	26.80	25.70	24.50	28.4	0.906	26,100
	85BER10H	25.60	24.60	29.50	36.1	0.906	23,300
	90BNR10H	35.00	33.00	31.50	30.7	1.155	24,400
	90BER10H	33.50	31.50	38.00	38.8	1.155	21,800
	95BNR10H	35.50	34.50	32.50	31.3	1.209	23,400
	95BER10H	34.00	33.00	39.50	39.7	1.209	20,900
	100BNR10H	36.00	36.00	34.00	32.3	1.253	22,400
	100BER10H	34.50	34.50	41.00	41.2	1.253	20,000
	105BNR10H	41.00	41.00	39.00	34.5	1.585	21,200
	105BER10H	39.00	39.50	47.50	43.9	1.585	18,900
	110BNR10H	46.00	47.00	44.50	36.7	1.996	20,000
	110BER10H	44.00	45.00	54.00	46.7	1.996	17,900
	120BNR10H	47.50	50.50	48.00	38.4	2.139	18,700
	120BER10H	45.50	48.50	58.00	49.0	2.139	16,700

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