
SKF

Self-aligning ball bearings

Designs

The self-aligning ball bearing was invented by SKF. It has two rows of balls and a common sphered raceway in the outer ring. The bearing is consequently self-aligning and insensitive to angular misalignments of the shaft relative to the housing. It is particularly suitable for applications where considerable shaft deflections or misalignment are to be expected. Additionally, the self-aligning ball bearing has the lowest friction of all rolling bearings, which enables it to run cooler even at high speeds.

SKF produces self-aligning ball bearings to several designs. These are

- open bearings of the basic design (→ **fig. 1**)
- sealed bearings (→ **fig. 2**)
- open bearings with an extended inner ring (→ **fig. 3**).

Fig. 1

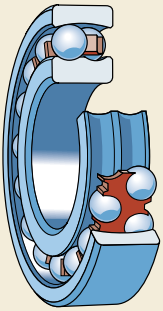


Fig. 2

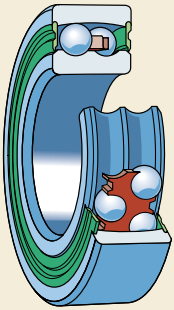
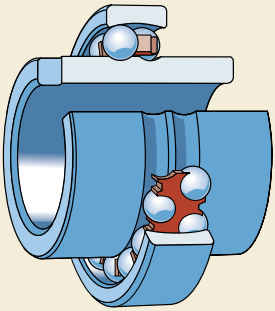


Fig. 3



Basic design

The basic design self-aligning ball bearing is available with a cylindrical bore or, in certain size ranges, with a tapered bore (taper 1:12).

Large self-aligning ball bearings in the 130 and 139 series originally developed for specific applications in paper mills, can be used in any application where low friction is preferred over high load carrying capacity. These bearings are provided with an annular groove and lubrication holes in the outer ring and lubrication holes in the inner ring (→ **fig. 4**).

The balls of some bearings in the 12 and 13 series protrude from the sides of the bearing. The values of the protrusion are provided in **table 1** and should be considered when designing the associated components of the bearing arrangement.

Sealed bearings

SKF self-aligning ball bearings are also available in a sealed version with contact seals on both sides – designation suffix 2RS1 (→ **fig.5**). These sheet steel reinforced seals are made of oil and wear-resistant acrylonitrile-butadiene rubber (NBR). The permissible operating temperature range for these seals is –40 to +100 °C and up to +120 °C for brief periods. The seal lip contacts a smooth chamfer on the inner ring with light pressure.

Fig. 4

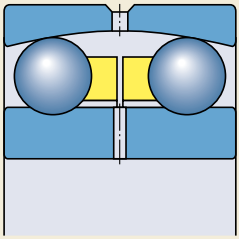
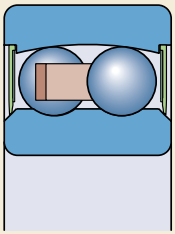


Fig. 5



Sealed bearings are lubricated as standard with a grease with lithium thickener that has good rust inhibiting properties and other characteristics according to **table 2**.

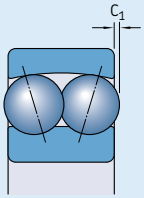
SKF sealed self-aligning ball bearings are available with a cylindrical bore. Some sizes are also available with a tapered bore (taper 1:12).

Note

Sealed bearings are lubricated for life and require no maintenance. They should not be heated above 80 °C before mounting and should not be washed.

Table 1

Protrusion of balls from bearing side faces



Bearing	Protrusion C_1
–	mm
1224 (K)	1,3
1226	1,4
1318 (K)	1
1319 (K)	1,5
1320 (K)	2,5
1322 (K)	2,6

Table 2

SKF standard grease filling for sealed self-aligning ball bearings

Technical specification	SKF greases MT47	MT33
Bearing outside diameter, mm	≤ 62	> 62
Thickener	Lithium soap	Lithium soap
Base oil type	Mineral oil	Mineral oil
NLGI consistency class	2	3
Temperature range, °C[1)]	–30 to +110	–30 to +120
Base oil viscosity, mm^2/s		
at 40 °C	70	98
at 100 °C	7,3	9,4

[1)] For safe operating temperature, → section "Temperature range – the SKF traffic light concept", starting on **page 232**

Bearings with an extended inner ring

Self-aligning ball bearings with an extended inner ring are designed for less demanding applications using commercial grade shafting. The special bore tolerance enables easy mounting and dismounting.

Self-aligning ball bearings with an extended inner ring are axially located on the shaft by means of a pin or shouldered screw (→ **fig. 6**), which engages in a slot at one side of the inner ring and also prevents the inner ring from turning on the shaft.

When two self-aligning ball bearings with an extended inner ring are used to support a shaft, they should be positioned so that the inner ring slots either face each other, or are at the outboard positions of the bearings (→ **fig. 7**). If this is not the case, the shaft is axially located in one direction only.

Fig. 6

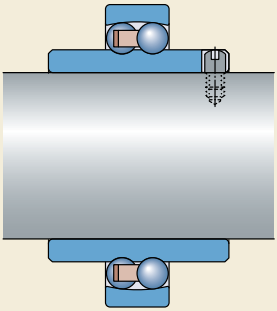
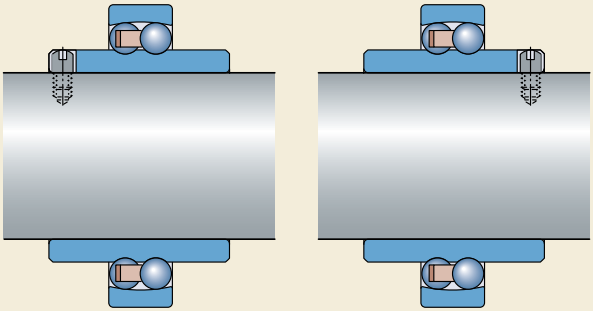


Fig. 7



Bearings on sleeves

Adapter and withdrawal sleeves are used to secure bearings with a tapered bore onto cylindrical shaft seats. They facilitate bearing mounting and dismounting and often simplify bearing arrangement design.

Adapter sleeves (→ **figs. 8** and **9**) are more popular than withdrawal sleeves (→ **fig. 10**) as they do not require axial locating devices on the shaft. That is why only adapter sleeves are shown together with suitable bearings in the product table, starting on **page 496**.

SKF adapter sleeves are slotted and are supplied complete with lock nut and locking device. The adapter sleeves for use with sealed self-aligning ball bearings are equipped with a special locking washer that has a protrusion on the side facing the bearing, in order to prevent the seal from being damaged (→ **fig. 11**). These sleeves are identified by the suffix C.

Fig. 8

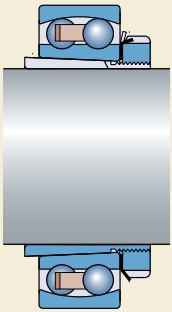


Fig. 9

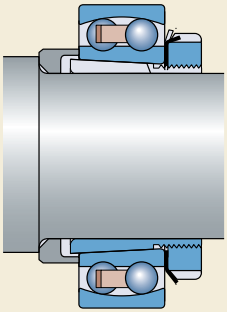


Fig. 11

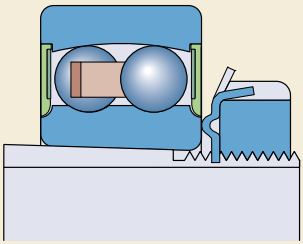
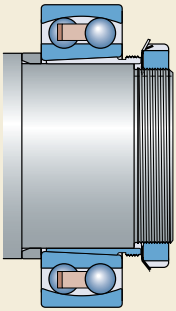


Fig. 10



Self-aligning ball bearing kits

To facilitate procurement and to provide the correct bearing/sleeve combination, SKF offers the most popular self-aligning ball bearings together with the suitable adapter sleeve as a kit (→ **fig. 12**).

Mounting can easily be performed with the help of the SKF lock nut spanner set TMHN 7 (→ **page 1070**).

The range of these kits is shown in **table 3**.

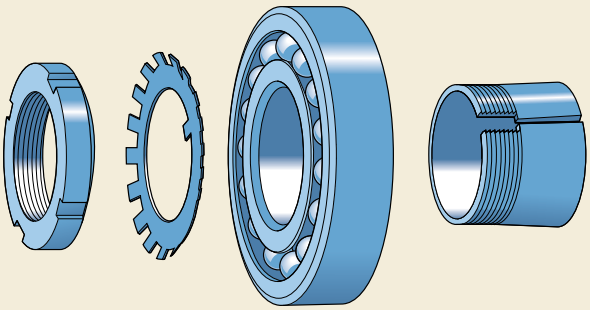
Table 3

SKF self-aligning ball bearing/adapter sleeve kits

Bearing kit Designation	**Parts** Designation Bearing	Sleeve	**Shaft diameter** mm
KAM 1206	1206 EKTN9/C3	H 206	25
KAM 1207	1207 EKTN9/C3	H 207	30
KAM 1208	1208 EKTN9/C3	H 208	35
KAM 1209	1209 EKTN9/C3	H 209	40
KAM 1210	1210 EKTN9/C3	H 210	45
KAM 1211	1211 EKTN9/C3	H 211	50

The technical data are provided in the product table on **pages 496** to **499**

Fig. 12



Appropriate bearing housings

Self-aligning ball bearings with a cylindrical bore or with a tapered bore on adapter sleeve can be mounted in a variety of housings, such as

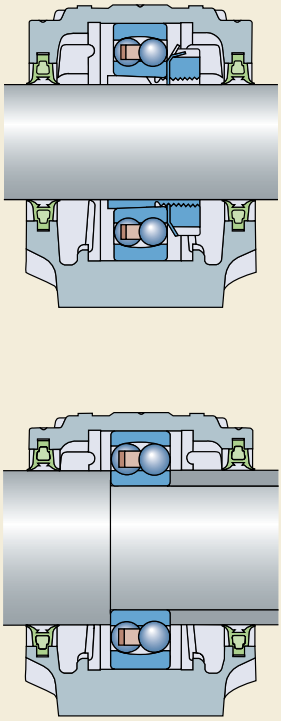
- SNL plummer (pillow) block housings in the 2, 3, 5 and 6 series (→ **fig. 13**)
- TVN housings
- FNL flanged housings
- SAF plummer (pillow) block housings for inch-size shafts.

Bearings with an extended inner ring can be mounted in specially designed housings, such as

- TN housings
- I-1200(00) flanged housings.

A brief description of these housings is provided in the section “Bearing housings”, starting on **page 1031**. Detailed information on these housings can be found in the “SKF Interactive Engineering Catalogue” online at www.skf.com.

Fig. 13



Bearing data – general

Dimensions

The boundary dimensions of SKF self-aligning ball bearings, with the exception of those with an extended inner ring, are in accordance with ISO 15:1998. The dimensions of the bearings with an extended inner ring follow DIN 630, part 2, withdrawn in 1993.

Tolerances

SKF self-aligning ball bearings are manufactured as standard to Normal tolerances, except the bore of the bearings with extended inner ring, which is produced to tolerance JS7.

The values of the Normal tolerances are in accordance with ISO 492:2002 and can be found in **table 3** on **page 125**.

Misalignment

The design of self-aligning ball bearings is such that angular misalignment between the outer and the inner rings can be accommodated without any negative effect on bearing performance.

Guideline values for the permissible angular misalignment between outer and inner rings under normal operating conditions are provided in **table 4**. Whether these values can be fully exploited depend on the bearing arrangement design and the type of seal used.

Internal clearance

SKF self-aligning ball bearings are produced as standard with Normal radial internal clearance and most are also available with the greater C3 clearance. Many bearings can also be supplied with the smaller C2 clearance or the much greater C4 clearance.

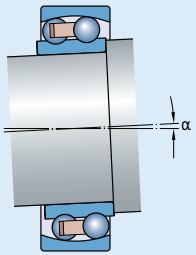
Bearings in the 130 and 139 series have C3 radial internal clearance as standard.

Bearings with an extended inner ring have a radial internal clearance which lies in the C2 + Normal range.

Clearance values are provided in **table 5** and are in accordance with ISO 5753:1991. They are valid for unmounted bearings under zero measuring loads.

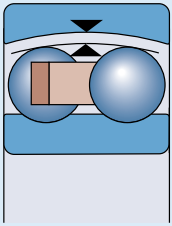
Table 4

Permissible angular misalignment



Bearings/ series	Misalignment α
–	degrees
108, 126, 127, 129, 135	3
12 (E)	2,5
13 (E)	3
22 (E)	2,5
22 E-2RS1	1,5
23 (E)	3
23 E-2RS1	1,5
112 (E)	2,5
130, 139	3

Radial internal clearance of self-aligning ball bearings



Bore diameter d		Radial internal clearance C2		Normal		C3		C4	
over	incl.	min	max	min	max	min	max	min	max
mm		µm							
Bearings with a cylindrical bore									
2,5	**6**	1	8	5	15	10	20	15	25
6	**10**	2	9	6	17	12	25	19	33
10	**14**	2	10	6	19	13	26	21	35
14	**18**	3	12	8	21	15	28	23	37
18	**24**	4	14	10	23	17	30	25	39
24	**30**	5	16	11	24	19	35	29	46
30	**40**	6	18	13	29	23	40	34	53
40	**50**	6	19	14	31	25	44	37	57
50	**65**	7	21	16	36	30	50	45	69
65	**80**	8	24	18	40	35	60	54	83
80	**100**	9	27	22	48	42	70	64	96
100	**120**	10	31	25	56	50	83	75	114
120	**140**	10	38	30	68	60	100	90	135
140	**150**	–	–	–	–	70	120	–	–
150	**180**	–	–	–	–	80	130	–	–
180	**200**	–	–	–	–	90	150	–	–
200	**220**	–	–	–	–	100	165	–	–
220	**240**	–	–	–	–	110	180	–	–
Bearings with a tapered bore									
18	**24**	7	17	13	26	20	33	28	42
24	**30**	9	20	15	28	23	39	33	50
30	**40**	12	24	19	35	29	46	40	59
40	**50**	14	27	22	39	33	52	45	65
50	**65**	18	32	27	47	41	61	56	80
65	**80**	23	39	35	57	50	75	69	98
80	**100**	29	47	42	68	62	90	84	116
100	**120**	35	56	50	81	75	108	100	139

Please refer to **page 137** for the definition of radial internal clearance

Cages

Depending on the bearing series and size, SKF self-aligning ball bearings are fitted as standard with one of the following cages (→ **fig. 14**)

- a one-piece pressed steel cage, ball centred, no designation suffix (**a**)
- a two-piece pressed steel cage, ball centred, no designation suffix (**b**)
- a one-piece (**c**) or two-piece injection moulded snap-type cage of glass fibre reinforced polyamide 6,6, ball centred, designation suffix TN9
- a one-piece (**c**) or two-piece injection moulded snap-type cage of polyamide 6,6, ball centred, designation suffix TN
- a one-piece or two-piece (**d**) machined brass cage, ball centred, designation suffix M or no suffix (large size).

Contact SKF for availability of bearings with non-standard cages.

Note

Self-aligning ball bearings with polyamide 6,6 cages can be operated at temperatures up to +120 °C. The lubricants generally used for rolling bearings do not have a detrimental effect on cage properties, with the exception of a few synthetic oils and greases with a synthetic oil base, and lubricants containing a high proportion of EP additives when used at high temperatures.

For bearing arrangements, which are to be operated at continuously high temperatures or under arduous conditions, it is recommended to use bearings with a pressed steel or machined brass cage.

For detailed information about the temperature resistance and the applicability of cages, please refer to the section “Cage materials”, starting on **page 140**.

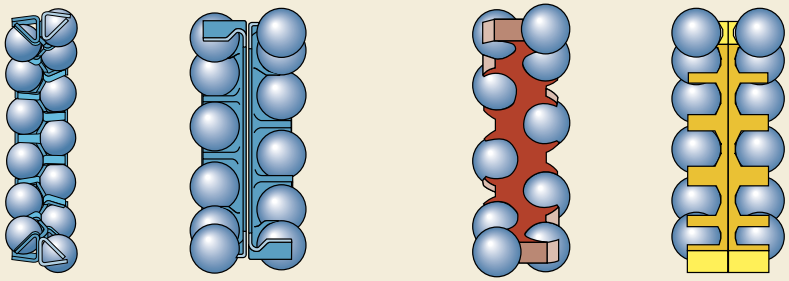
Axial load carrying capacity

The ability of a self-aligning ball bearing mounted on an adapter sleeve on smooth shafts without an integral shoulder to carry axial loads, depends on the friction between the sleeve and shaft. The permissible axial load can be approximately determined from

$F_{ap} = 0{,}003\ B\ d$

where
F_{ap} = maximum permissible axial load, kN
B = bearing width, mm
d = bearing bore diameter, mm

Fig. 14



Minimum load

In order to provide satisfactory operation, self-aligning ball bearings, like all ball and roller bearings, must always be subjected to a given minimum load, particularly if they are to operate at high speeds or are subjected to high accelerations or rapid changes in the direction of load. Under such conditions, the inertia forces of the balls and cage, and the friction in the lubricant, can have a detrimental influence on the rolling conditions in the bearing arrangement and may cause damaging sliding movements to occur between the balls and raceways.

The requisite minimum load to be applied to self-aligning ball bearings can be estimated using

$$P_m = 0{,}01\ C_0$$

where
P_m = equivalent minimum load, kN
C_0 = basic static load rating, kN
(→ product tables)

When starting up at low temperatures or when the lubricant is highly viscous, even greater minimum loads may be required. The weight of the components supported by the bearing, together with external forces, generally exceeds the requisite minimum load. If this is not the case, the self-aligning ball bearing must be subjected to an additional radial load, for example, by increasing belt tension or by similar means.

Equivalent dynamic bearing load

$$P = F_r + Y_1 F_a \quad \text{when } F_a/F_r \leq e$$
$$P = 0{,}65 F_r + Y_2 F_a \quad \text{when } F_a/F_r > e$$

Values of Y_1, Y_2 and e can be found in the product tables.

Equivalent static bearing load

$$P_0 = F_r + Y_0 F_a$$

Values of Y_0 can be found in the product tables.

Supplementary designations

The designation suffixes used to identify certain features of SKF self-aligning ball bearings are explained in the following.

C3 Radial internal clearance greater than Normal
E Optimized internal design
K Tapered bore, taper 1:12
M Machined brass cage, ball centred
2RS1 Sheet steel reinforced contact seal of acrylonitrile-butadiene rubber (NBR) on both sides of the bearing
TN Injection moulded snap-type cage of polyamide 6,6, ball centred
TN9 Injection moulded snap-type cage of glass fibre reinforced polyamide 6,6, ball centred

Mounting bearings with a tapered bore

Self-aligning ball bearings with a tapered bore are always mounted with an interference fit on a tapered shaft seat or an adapter or withdrawal sleeve. As a measure of the degree of interference of the fit, either the reduction in radial internal clearance of the bearing or the axial displacement of the inner ring on its tapered seat is used.

Suitable methods for mounting self-aligning ball bearings with tapered bore are:

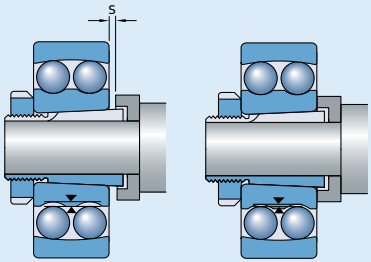
- Measuring the clearance reduction.
- Measuring the lock nut tightening angle.
- Measuring the axial drive-up.

Measuring the clearance reduction

When mounting basic design self-aligning ball bearings with the relatively small Normal radial internal clearance, it is generally sufficient to check clearance during the drive-up by turning and swivelling out the outer ring. When the bearing is properly mounted the outer ring can be easily turned but there should be a slight resistance when the outer ring is swivelled out. The bearing will then have the requisite interference fit. In some cases the residual internal clearance may be too small for the application, and a bearing with C3 radial internal clearance should be used instead.

Table 6

Mounting self-aligning ball bearings with a tapered bore



Bore diameter d	Tightening angle α	Axial drive-up s
mm	degrees	mm
20	80	0,22
25	55	0,22
30	55	0,22
35	70	0,30
40	70	0,30
45	80	0,35
50	80	0,35
55	75	0,40
60	75	0,40
65	80	0,40
70	80	0,40
75	85	0,45
80	85	0,45
85	110	0,60
90	110	0,60
95	110	0,60
100	110	0,60
110	125	0,70
120	125	0,70

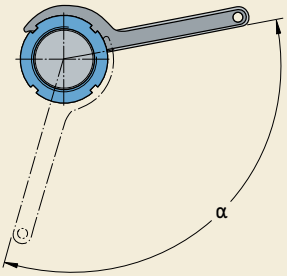
Measuring the lock nut tightening angle

The procedure for using the nut tightening angle α (→ **fig. 15**) represents an easy method for mounting self-aligning ball bearings with a tapered bore correctly. Recommended values for the nut tightening angle α are provided in **table 6**.

Before starting the final tightening procedure, the bearing should be pushed up on the tapered seat until the bore of the bearing or sleeve is in contact with the seat on the shaft around its whole circumference, i.e. the bearing inner ring cannot be rotated relatively to the shaft. By then turning the nut through the given angle α, the bearing will be pressed up the tapered seat. The residual clearance of the bearing should be checked by turning and swivelling out the outer ring.

Then unscrew the nut, place the locking washer in position and thighten the nut firmly again. Lock the nut by bending one of the locking washer tabs into one of the nut slots.

Fig. 15



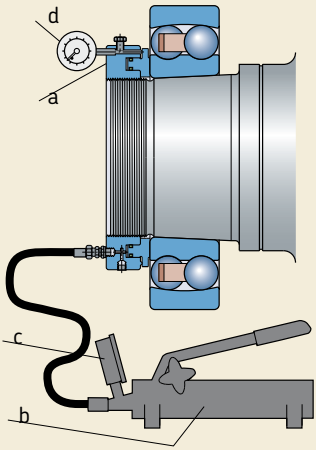
Measuring the axial drive-up

Mounting bearings with a tapered bore can be done by measuring the axial drive-up of the inner ring on its seat. Recommended values for the required axial drive-up "s" for general applications are provided in **table 6**.

The most suitable method in this case is the SKF Drive-up Method. This mounting method provides a very reliable and easy way to determine the starting position for a bearing from which the axial displacement is to be measured. For that, the following mounting tools (→ **fig. 16**) must be used

- an SKF hydraulic nut of the HMV .. E design (**a**)
- an appropriate hydraulic pump (**b**)
- a pressure gauge (**c**), appropriate to the mounting conditions
- a dial gauge (**d**).

Fig. 16

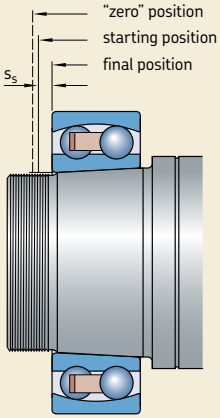


Applying the SKF Drive-up Method, the bearing is pushed up its seat to a defined starting position (→ **fig. 17**) using a given oil pressure (corresponding to a given drive-up force) in the hydraulic nut. In this way, part of the desired reduction in radial internal clearance is achieved. The oil pressure is monitored by the pressure gauge. The bearing is then driven up from the defined starting position through a given distance to its final position. The axial displacement "s_s" is accurately determined using the dial gauge mounted on the hydraulic nut.

SKF has determined values of the requisite oil pressure and the axial displacement for individual bearings. These values apply to bearing arrangements (→ **fig. 18**) with

- one sliding interface (**a** and **b**) or
- two sliding interfaces (**c**).

Fig. 17

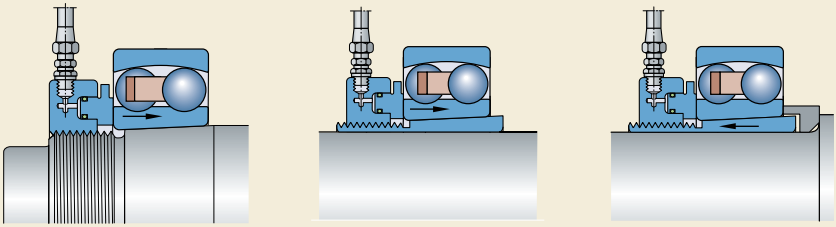


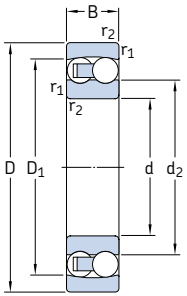
Additional mounting information

Additional information on mounting self-aligning ball bearings in general or with the aid of the SKF Drive-up Method can be found

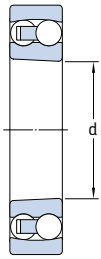
- in the handbook "SKF Drive-up Method" on CD-ROM
- online at www.skf.com/mount.

Fig. 18



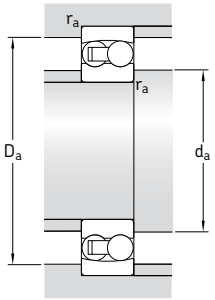


Cylindrical bore

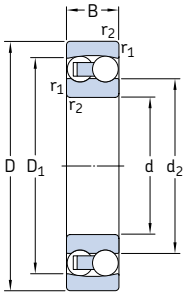


Tapered bore

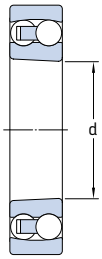
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed		Bearing with cylindrical bore	tapered bore
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
5	19	6	2,51	0,48	0,025	63 000	45 000	0,009	**135 TN9**	**–**
6	19	6	2,51	0,48	0,025	70 000	45 000	0,009	**126 TN9**	**–**
7	22	7	2,65	0,56	0,029	63 000	40 000	0,014	**127 TN9**	**–**
8	22	7	2,65	0,56	0,029	60 000	40 000	0,014	**108 TN9**	**–**
9	26	8	3,90	0,82	0,043	60 000	38 000	0,022	**129 TN9**	**–**
10	30	9	5,53	1,18	0,061	56 000	36 000	0,034	**1200 ETN9**	**–**
	30	14	8,06	1,73	0,090	50 000	34 000	0,047	**2200 ETN9**	**–**
12	32	10	6,24	1,43	0,072	50 000	32 000	0,040	**1201 ETN9**	**–**
	32	14	8,52	1,90	0,098	45 000	30 000	0,053	**2201 ETN9**	**–**
	37	12	9,36	2,16	0,12	40 000	28 000	0,067	**1301 ETN9**	**–**
	37	17	11,7	2,70	0,14	38 000	28 000	0,095	**2301**	**–**
15	35	11	7,41	1,76	0,09	45 000	28 000	0,049	**1202 ETN9**	**–**
	35	14	8,71	2,04	0,11	38 000	26 000	0,060	**2202 ETN9**	**–**
	42	13	10,8	2,60	0,14	34 000	24 000	0,094	**1302 ETN9**	**–**
	42	17	11,9	2,90	0,15	32 000	24 000	0,12	**2302**	**–**
17	40	12	8,84	2,20	0,12	38 000	24 000	0,073	**1203 ETN9**	**–**
	40	16	10,6	2,55	0,14	34 000	24 000	0,088	**2203 ETN9**	**–**
	47	14	12,7	3,40	0,18	28 000	20 000	0,12	**1303 ETN9**	**–**
	47	19	14,6	3,55	0,19	30 000	22 000	0,16	**2303**	**–**
20	47	14	12,7	3,4	0,18	32 000	20 000	0,12	**1204 ETN9**	**1204 EKTN9**
	47	18	16,8	4,15	0,22	28 000	20 000	0,14	**2204 ETN9**	**–**
	52	15	14,3	4	0,21	26 000	18 000	0,16	**1304 ETN9**	**–**
	52	21	18,2	4,75	0,24	26 000	19 000	0,22	**2304 TN**	**–**
25	52	15	14,3	4	0,21	28 000	18 000	0,14	**1205 ETN9**	**1205 EKTN9**
	52	18	16,8	4,4	0,23	26 000	18 000	0,16	**2205 ETN9**	**2205 EKTN9**
	62	17	19	5,4	0,28	22 000	15 000	0,26	**1305 ETN9**	**1305 EKTN9**
	62	24	27	7,1	0,37	22 000	16 000	0,34	**2305 ETN9**	**–**



Dimensions				Abutment and fillet dimensions			Calculation factors			
d	d_2 ~	D_1 ~	$r_{1,2}$ min	d_a min	D_a max	r_a max	e	Y_1	Y_2	Y_0
mm				mm			–			
5	10,3	15,4	0,3	7,4	16,6	0,3	0,33	1,9	3	2
6	10,3	15,4	0,3	8,4	16,6	0,3	0,33	1,9	3	2
7	12,6	17,6	0,3	9,4	19,6	0,3	0,33	1,9	3	2
8	12,6	17,6	0,3	10,4	19,6	0,3	0,33	1,9	3	2
9	14,8	21,1	0,3	11,4	23,6	0,3	0,33	1,9	3	2
10	16,7	24,4	0,6	14,2	25,8	0,6	0,33	1,9	3	2
	15,3	24,3	0,6	14,2	25,8	0,6	0,54	1,15	1,8	1,3
12	18,2	26,4	0,6	16,2	27,8	0,6	0,33	1,9	3	2
	17,5	26,5	0,6	16,2	27,8	0,6	0,50	1,25	2	1,3
	20	30,8	1	17,6	31,4	1	0,35	1,8	2,8	1,8
	18,6	31	1	17,6	31,4	1	0,60	1,05	1,6	1,1
15	21,2	29,6	0,6	19,2	30,8	0,6	0,33	1,9	3	2
	20,9	30,2	0,6	19,2	30,8	0,6	0,43	1,5	2,3	1,6
	23,9	35,3	1	20,6	36,4	1	0,31	2	3,1	2,2
	23,2	35,2	1	20,6	36,4	1	0,52	1,2	1,9	1,3
17	24	33,6	0,6	21,2	35,8	0,6	0,31	2	3,1	2,2
	23,8	34,1	0,6	21,2	35,8	0,6	0,43	1,5	2,3	1,6
	28,9	41	1	22,6	41,4	1	0,30	2,1	3,3	2,2
	25,8	39,4	1	22,6	41,4	1	0,52	1,2	1,9	1,3
20	28,9	41	1	25,6	41,4	1	0,30	2,1	3,3	2,2
	27,4	41	1	25,6	41,4	1	0,40	1,6	2,4	1,6
	33,3	45,6	1,1	27	45	1	0,28	2,2	3,5	2,5
	28,8	43,7	1,1	27	45	1	0,52	1,2	1,9	1,3
25	33,3	45,6	1	30,6	46,4	1	0,28	2,2	3,5	2,5
	32,3	46,1	1	30,6	46,4	1	0,35	1,8	2,8	1,8
	37,8	52,5	1,1	32	55	1	0,28	2,2	3,5	2,5
	35,5	53,5	1,1	32	55	1	0,44	1,4	2,2	1,4

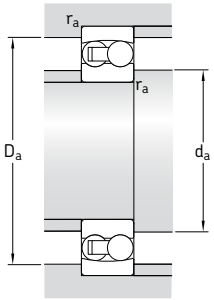


Cylindrical bore

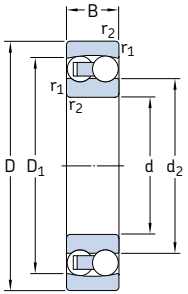


Tapered bore

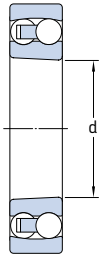
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference	Limiting		Bearing with	
d	D	B	C	C_0	P_u	speed	speed		cylindrical bore	tapered bore
mm			kN		kN	r/min		kg	–	
30	62	16	15,6	4,65	0,24	24 000	15 000	0,22	**1206 ETN9**	**1206 EKTN9**
	62	20	23,8	6,7	0,35	22 000	15 000	0,26	**2206 ETN9**	**2206 EKTN9**
	72	19	22,5	6,8	0,36	19 000	13 000	0,39	**1306 ETN9**	**1306 EKTN9**
	72	27	31,2	8,8	0,45	18 000	13 000	0,50	**2306**	**2306 K**
35	72	17	19	6	0,31	20 000	13 000	0,32	**1207 ETN9**	**1207 EKTN9**
	72	23	30,7	8,8	0,46	18 000	12 000	0,40	**2207 ETN9**	**2207 EKTN9**
	80	21	26,5	8,5	0,43	16 000	11 000	0,51	**1307 ETN9**	**1307 EKTN9**
	80	31	39,7	11,2	0,59	16 000	12 000	0,68	**2307 ETN9**	**2307 EKTN9**
40	80	18	19,9	6,95	0,36	18 000	11 000	0,42	**1208 ETN9**	**1208 EKTN9**
	80	23	31,9	10	0,51	16 000	11 000	0,51	**2208 ETN9**	**2208 EKTN9**
	90	23	33,8	11,2	0,57	14 000	9 500	0,68	**1308 ETN9**	**1308 EKTN9**
	90	33	54	16	0,82	14 000	10 000	0,93	**2308 ETN9**	**2308 EKTN9**
45	85	19	22,9	7,8	0,40	17 000	11 000	0,47	**1209 ETN9**	**1209 EKTN9**
	85	23	32,5	10,6	0,54	15 000	10 000	0,55	**2209 ETN9**	**2209 EKTN9**
	100	25	39	13,4	0,70	12 000	8 500	0,96	**1309 ETN9**	**1309 EKTN9**
	100	36	63,7	19,3	1	13 000	9 000	1,25	**2309 ETN9**	**2309 EKTN9**
50	90	20	26,5	9,15	0,48	16 000	10 000	0,53	**1210 ETN9**	**1210 EKTN9**
	90	23	33,8	11,2	0,57	14 000	9 500	0,60	**2210 ETN9**	**2210 EKTN9**
	110	27	43,6	14	0,72	12 000	8 000	1,20	**1310 ETN9**	**1310 EKTN9**
	110	40	63,7	20	1,04	14 000	9 500	1,65	**2310**	**2310 K**
55	100	21	27,6	10,6	0,54	14 000	9 000	0,71	**1211 ETN9**	**1211 EKTN9**
	100	25	39	13,4	0,70	12 000	8 500	0,81	**2211 ETN9**	**2211 EKTN9**
	120	29	50,7	18	0,92	11 000	7 500	1,60	**1311 ETN9**	**1311 EKTN9**
	120	43	76,1	24	1,25	11 000	7 500	2,10	**2311**	**2311 K**
60	110	22	31,2	12,2	0,62	12 000	8 500	0,90	**1212 ETN9**	**1212 EKTN9**
	110	28	48,8	17	0,88	11 000	8 000	1,10	**2212 ETN9**	**2212 EKTN9**
	130	31	58,5	22	1,12	9 000	6 300	1,95	**1312 ETN9**	**1312 EKTN9**
	130	46	87,1	28,5	1,46	9 500	7 000	2,60	**2312**	**2312 K**
65	120	23	35,1	14	0,72	11 000	7 000	1,15	**1213 ETN9**	**1213 EKTN9**
	120	31	57,2	20	1,02	10 000	7 000	1,45	**2213 ETN9**	**2213 EKTN9**
	140	33	65	25,5	1,25	8 500	6 000	2,45	**1313 ETN9**	**1313 EKTN9**
	140	48	95,6	32,5	1,66	9 000	6 300	3,25	**2313**	**2313 K**



Dimensions				Abutment and fillet dimensions			Calculation factors			
d	d_2 ~	D_1 ~	$r_{1,2}$ min	d_a min	D_a max	r_a max	e	Y_1	Y_2	Y_0
mm				mm			–			
30	40,1	53	1	35,6	56,4	1	0,25	2,5	3,9	2,5
	38,8	55	1	35,6	56,4	1	0,33	1,9	3	2
	44,9	60,9	1,1	37	65	1	0,25	2,5	3,9	2,5
	41,7	60,9	1,1	37	65	1	0,44	1,4	2,2	1,4
35	47	62,3	1,1	42	65	1	0,23	2,7	4,2	2,8
	45,3	64,2	1,1	42	65	1	0,31	2	3,1	2,2
	51,5	69,5	1,5	44	71	1,5	0,25	2,5	3,9	2,5
	46,5	68,4	1,5	44	71	1,5	0,46	1,35	2,1	1,4
40	53,6	68,8	1,1	47	73	1	0,22	2,9	4,5	2,8
	52,4	71,6	1,1	47	73	1	0,28	2,2	3,5	2,5
	61,5	81,5	1,5	49	81	1,5	0,23	2,7	4,2	2,8
	53,7	79,2	1,5	49	81	1,5	0,40	1,6	2,4	1,6
45	57,5	73,7	1,1	52	78	1	0,21	3	4,6	3,2
	55,3	74,6	1,1	52	78	1	0,26	2,4	3,7	2,5
	67,7	89,5	1,5	54	91	1,5	0,23	2,7	4,2	2,8
	60,1	87,4	1,5	54	91	1,5	0,33	1,9	3	2
50	61,7	79,5	1,1	57	83	1	0,21	3	4,6	3,2
	61,5	81,5	1,1	57	83	1	0,23	2,7	4,2	2,8
	70,3	95	2	61	99	2	0,24	2,6	4,1	2,8
	65,8	94,4	2	61	99	2	0,43	1,5	2,3	1,6
55	70,1	88,4	1,5	64	91	1,5	0,19	3,3	5,1	3,6
	67,7	89,5	1,5	64	91	1,5	0,23	2,7	4,2	2,8
	77,7	104	2	66	109	2	0,23	2,7	4,2	2,8
	72	103	2	66	109	2	0,40	1,6	2,4	1,6
60	78	97,6	1,5	69	101	1,5	0,19	3,3	5,1	3,6
	74,5	98,6	1,5	69	101	1,5	0,24	2,6	4,1	2,8
	91,6	118	2,1	72	118	2	0,22	2,9	4,5	2,8
	76,9	112	2,1	72	118	2	0,33	1,9	3	2
65	85,3	106	1,5	74	111	1,5	0,18	3,5	5,4	3,6
	80,7	107	1,5	74	111	1,5	0,24	2,6	4,1	2,8
	99	127	2,1	77	128	2	0,22	2,9	4,5	2,8
	85,5	122	2,1	77	128	2	0,37	1,7	2,6	1,8

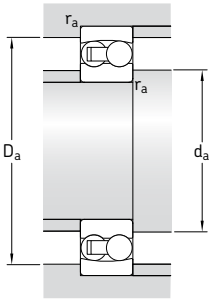


Cylindrical bore



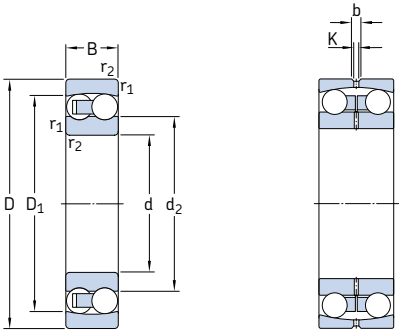
Tapered bore

Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing with cylindrical bore	tapered bore
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
70	125	24	35,8	14,6	0,75	11 000	7 000	1,25	**1214 ETN9**	**–**
	125	31	44,2	17	0,88	10 000	6 700	1,50	**2214**	**–**
	150	35	74,1	27,5	1,34	8 500	6 000	3,00	**1314**	**–**
	150	51	111	37,5	1,86	8 000	6 000	3,90	**2314**	**–**
75	130	25	39	15,6	0,80	10 000	6 700	1,35	**1215**	**1215 K**
	130	31	58,5	22	1,12	9 000	6 300	1,60	**2215 ETN9**	**2215 EKTN9**
	160	37	79,3	30	1,43	8 000	5 600	3,55	**1315**	**1315 K**
	160	55	124	43	2,04	7 500	5 600	4,70	**2315**	**2315 K**
80	140	26	39,7	17	0,83	9 500	6 000	1,65	**1216**	**1216 K**
	140	33	65	25,5	1,25	8 500	6 000	2,00	**2216 ETN9**	**2216 EKTN9**
	170	39	88,4	33,5	1,50	7 500	5 300	4,20	**1316**	**1316 K**
	170	58	135	49	2,24	7 000	5 300	6,10	**2316**	**2316 K**
85	150	28	48,8	20,8	0,98	9 000	5 600	2,05	**1217**	**1217 K**
	150	36	58,5	23,6	1,12	8 000	5 600	2,50	**2217**	**2217 K**
	180	41	97,5	38	1,70	7 000	4 800	5,00	**1317**	**1317 K**
	180	60	140	51	2,28	6 700	4 800	7,05	**2317**	**2317 K**
90	160	30	57,2	23,6	1,08	8 500	5 300	2,50	**1218**	**1218 K**
	160	40	70,2	28,5	1,32	7 500	5 300	3,40	**2218**	**2218 K**
	190	43	117	44	1,93	6 700	4 500	5,80	**1318**	**1318 K**
	190	64	153	57	2,50	6 300	4 500	8,45	**2318 M**	**2318 KM**
95	170	32	63,7	27	1,20	8 000	5 000	3,10	**1219**	**1219 K**
	170	43	83,2	34,5	1,53	7 000	5 000	4,10	**2219 M**	**2219 KM**
	200	45	133	51	2,16	6 300	4 300	6,70	**1319**	**1319 K**
	200	67	165	64	2,75	6 000	4 500	9,80	**2319 M**	**–**
100	180	34	68,9	30	1,29	7 500	4 800	3,70	**1220**	**1220 K**
	180	46	97,5	40,5	1,76	6 700	4 800	5,00	**2220 M**	**2220 KM**
	215	47	143	57	2,36	6 000	4 000	8,30	**1320**	**1320 K**
	215	73	190	80	3,25	5 600	4 000	12,5	**2320 M**	**2320 KM**
110	200	38	88,4	39	1,60	6 700	4 300	5,15	**1222**	**1222 K**
	200	53	124	52	2,12	6 000	4 300	7,10	**2222 M**	**2222 KM**
	240	50	163	72	2,75	5 300	3 600	12,0	**1322 M**	**1322 KM**
120	215	42	119	53	2,12	6 300	4 000	6,75	**1224 M**	**1224 KM**

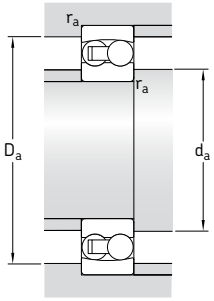


Dimensions				Abutment and fillet dimensions			Calculation factors			
d	d_2 ~	D_1 ~	$r_{1,2}$ min	d_a min	D_a max	r_a max	e	Y_1	Y_2	Y_0
mm				mm			–			
70	87,4	109	1,5	79	116	1,5	0,18	3,5	5,4	3,6
	87,5	111	1,5	79	116	1,5	0,27	2,3	3,6	2,5
	97,7	129	2,1	82	138	2	0,22	2,9	4,5	2,8
	91,6	130	2,1	82	138	2	0,37	1,7	2,6	1,8
75	93	116	1,5	84	121	1,5	0,17	3,7	5,7	4
	91,6	118	1,5	84	121	1,5	0,22	2,9	4,5	2,8
	104	138	2,1	87	148	2	0,22	2,9	4,5	2,8
	97,8	139	2,1	87	148	2	0,37	1,7	2,6	1,8
80	101	125	2	91	129	2	0,16	3,9	6,1	4
	99	127	2	91	129	2	0,22	2,9	4,5	2,8
	109	147	2,1	92	158	2	0,22	2,9	4,5	2,8
	104	148	2,1	92	158	2	0,37	1,7	2,6	1,8
85	107	134	2	96	139	2	0,17	3,7	5,7	4
	105	133	2	96	139	2	0,25	2,5	3,9	2,5
	117	155	3	99	166	2,5	0,22	2,9	4,5	2,8
	115	157	3	99	166	2,5	0,37	1,7	2,6	1,8
90	112	142	2	101	149	2	0,17	3,7	5,7	4
	112	142	2	101	149	2	0,27	2,3	3,6	2,5
	122	165	3	104	176	2,5	0,22	2,9	4,5	2,8
	121	164	3	104	176	2,5	0,37	1,7	2,6	1,8
95	120	151	2,1	107	158	2	0,17	3,7	5,7	4
	118	151	2,1	107	158	2	0,27	2,3	3,6	2,5
	127	174	3	109	186	2,5	0,23	2,7	4,2	2,8
	128	172	3	109	186	2,5	0,37	1,7	2,6	1,8
100	127	159	2,1	112	168	2	0,17	3,7	5,7	4
	124	160	2,1	112	168	2	0,27	2,3	3,6	2,5
	136	185	3	114	201	2,5	0,23	2,7	4,2	2,8
	135	186	3	114	201	2,5	0,37	1,7	2,6	1,8
110	140	176	2,1	122	188	2	0,17	3,7	5,7	4
	137	177	2,1	122	188	2	0,28	2,2	3,5	2,5
	154	206	3	124	226	2,5	0,22	2,9	4,5	2,8
120	149	190	2,1	132	203	2	0,19	3,3	5,1	3,6

Self-aligning ball bearings
d **130 – 240** mm

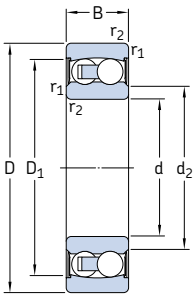


Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
130	230	46	127	58,5	2,24	5 600	3 600	8,30	**1226 M**
150	225	56	57,2	23,6	0,88	5 600	3 400	7,50	**13030**
180	280	74	95,6	40	1,34	4 500	2 800	16,0	**13036**
200	280	60	60,5	29	0,97	4 300	2 600	10,7	**13940**
220	300	60	60,5	30,5	0,97	3 800	2 400	11,0	**13944**
240	320	60	60,5	32	0,98	3 800	2 200	11,3	**13948**

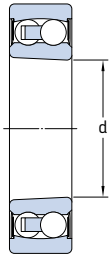


Dimensions						Abutment and fillet dimensions			Calculation factors			
d	d_2 ~	D_1 ~	b	K	$r_{1,2}$ min	d_a min	D_a max	r_a max	e	Y_1	Y_2	Y_0
mm						mm			–			
130	163	204	–	–	3	144	216	2,5	0,19	3,3	5,1	3,6
150	175	203	8,3	4,5	2,1	161	214	2	0,24	2,6	4,1	2,8
180	212	249	13,9	7,5	2,1	191	269	2	0,25	2,5	3,9	2,5
200	229	258	8,3	4,5	2,1	211	269	2	0,19	3,3	5,1	3,6
220	249	278	8,3	4,5	2,1	231	289	2	0,18	3,5	5,4	3,6
240	269	298	8,3	4,5	2,1	251	309	2	0,16	3,9	6,1	4

Sealed self-aligning ball bearings
d **10 – 70** mm

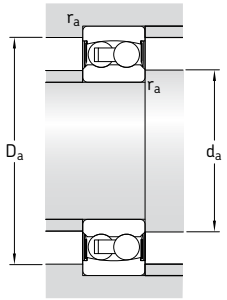


Cylindrical bore



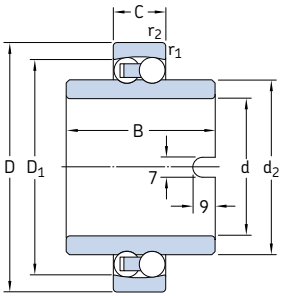
Tapered bore

Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Limiting speed	Mass	Designations Bearing with cylindrical bore	tapered bore
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min	kg	–	
10	30	14	5,53	1,18	0,06	17 000	0,048	**2200 E-2RS1TN9**	**–**
12	32	14	6,24	1,43	0,08	16 000	0,053	**2201 E-2RS1TN9**	**–**
15	35	14	7,41	1,76	0,09	14 000	0,058	**2202 E-2RS1TN9**	**–**
	42	17	10,8	2,6	0,14	12 000	0,11	**2302 E-2RS1TN9**	**–**
17	40	16	8,84	2,2	0,12	12 000	0,089	**2203 E-2RS1TN9**	**–**
	47	19	12,7	3,4	0,18	11 000	0,16	**2303 E-2RS1TN9**	**–**
20	47	18	12,7	3,4	0,18	10 000	0,14	**2204 E-2RS1TN9**	**–**
	52	21	14,3	4	0,21	9 000	0,21	**2304 E-2RS1TN9**	**–**
25	52	18	14,3	4	0,21	9 000	0,16	**2205 E-2RS1TN9**	**2205 E-2RS1KTN9**
	62	24	19	5,4	0,28	7 500	0,34	**2305 E-2RS1TN9**	**–**
30	62	20	15,6	4,65	0,24	7 500	0,26	**2206 E-2RS1TN9**	**2206 E-2RS1KTN9**
	72	27	22,5	6,8	0,36	6 700	0,51	**2306 E-2RS1TN9**	**–**
35	72	23	19	6	0,31	6 300	0,41	**2207 E-2RS1TN9**	**2207 E-2RS1KTN9**
	80	31	26,5	8,5	0,43	5 600	0,70	**2307 E-2RS1TN9**	**–**
40	80	23	19,9	6,95	0,36	5 600	0,50	**2208 E-2RS1TN9**	**2208 E-2RS1KTN9**
	90	33	33,8	11,2	0,57	5 000	0,96	**2308 E-2RS1TN9**	**–**
45	85	23	22,9	7,8	0,40	5 300	0,53	**2209 E-2RS1TN9**	**2209 E-2RS1KTN9**
	100	36	39	13,4	0,70	4 500	1,30	**2309 E-2RS1TN9**	**–**
50	90	23	22,9	8,15	0,42	4 800	0,57	**2210 E-2RS1TN9**	**2210 E-2RS1KTN9**
	110	40	43,6	14	0,72	4 000	1,65	**2310 E-2RS1TN9**	**–**
55	100	25	27,6	10,6	0,54	4 300	0,79	**2211 E-2RS1TN9**	**2211 E-2RS1KTN9**
60	110	28	31,2	12,2	0,62	3 800	1,05	**2212 E-2RS1TN9**	**2212 E-2RS1KTN9**
65	120	31	35,1	14	0,72	3 600	1,40	**2213 E-2RS1TN9**	**2213 E-2RS1KTN9**
70	125	31	35,8	14,6	0,75	3 400	1,45	**2214 E-2RS1TN9**	**–**

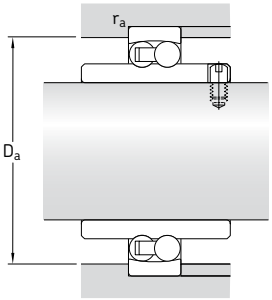


Dimensions				Abutment and fillet dimensions				Calculation factors			
d	d_2 ~	D_1 ~	$r_{1,2}$ min	d_a min	d_a max	D_a max	r_a max	e	Y_1	Y_2	Y_0
mm				mm				–			
10	14	24,8	0,6	14	14	25,8	0,6	0,33	1,9	3	2
12	15,5	27,4	0,6	15,5	15,5	27,8	0,6	0,33	1,9	3	2
15	19,1	30,4	0,6	19	19	30,8	0,6	0,33	1,9	3	2
	20,3	36,3	1	20	20	36,4	1	0,31	2	3,1	2,2
17	21,1	35	0,6	21	21	35,8	0,6	0,31	2	3,1	2,2
	25,5	41,3	1	22	25,5	41,4	1	0,30	2,1	3,3	2,2
20	25,9	41,3	1	25	25,5	41,4	1	0,30	2,1	3,3	2,2
	28,6	46,3	1,1	26,5	28,5	45	1	0,28	2,2	3,5	2,5
25	31	46,3	1	30,6	31	46,4	1	0,28	2,2	3,5	2,5
	32,8	52,7	1,1	32	32,5	55	1	0,28	2,2	3,5	2,5
30	36,7	54,1	1	35,6	36,5	56,4	1	0,25	2,5	3,9	2,5
	40,4	61,9	1,1	37	40	65	1	0,25	2,5	3,9	2,5
35	42,7	62,7	1,1	42	42,5	65	1	0,23	2,7	4,2	2,8
	43,7	69,2	1,5	43,5	43,5	71	1,5	0,25	2,5	3,9	2,5
40	49	69,8	1,1	47	49	73	1	0,22	2,9	4,5	2,8
	55,4	81,8	1,5	49	55	81	1,5	0,23	2,7	4,2	2,8
45	53,1	75,3	1,1	52	53	78	1	0,21	3	4,6	3,2
	60,9	90	1,5	54	60,5	91	1,5	0,23	2,7	4,2	2,8
50	58,1	79,5	1,1	57	58	83	1	0,20	3,2	4,9	3,2
	62,9	95,2	2	61	62,5	99	2	0,24	2,6	4,1	2,8
55	65,9	88,5	1,5	64	65,5	91	1,5	0,19	3,3	5,1	3,6
60	73,2	97	1,5	69	73	101	1,5	0,19	3,3	5,1	3,6
65	79,3	106	1,5	74	79	111	1,5	0,18	3,5	5,4	3,6
70	81,4	109	1,5	79	81	116	1,5	0,18	3,5	5,4	3,6

Self-aligning ball bearings with extended inner ring
d **20 – 60** mm

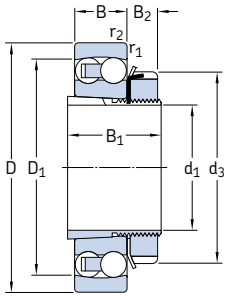


Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Limiting speed	Mass	Designation
d	D	C	C	C_0	P_u			
mm			kN		kN	r/min	kg	–
20	47	14	12,7	3,4	0,18	9 000	0,18	**11204 ETN9**
25	52	15	14,3	4	0,21	8 000	0,22	**11205 ETN9**
30	62	16	15,6	4,65	0,24	6 700	0,35	**11206 TN9**
35	72	17	15,9	5,1	0,27	5 600	0,54	**11207 TN9**
40	80	18	19	6,55	0,34	5 000	0,72	**11208 TN9**
45	85	19	21,6	7,35	0,38	4 500	0,77	**11209 TN9**
50	90	20	22,9	8,15	0,42	4 300	0,85	**11210 TN9**
60	110	22	30,2	11,6	0,60	3 400	1,15	**11212 TN9**

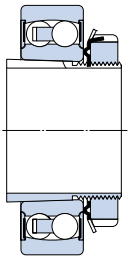


Dimensions					Abutment and fillet dimensions		Calculation factors			
d	d_2 ~	D_1 ~	B	$r_{1,2}$ min	D_a max	r_a max	e	Y_1	Y_2	Y_0
mm					mm		–			
20	28,9	41	40	1	41,4	1	0,30	2,1	3,3	2,2
25	33,3	45,6	44	1	46,4	1	0,28	2,2	3,5	2,5
30	40,1	53,2	48	1	56,4	1	0,25	2,5	3,9	2,5
35	47,7	60,7	52	1,1	65	1	0,23	2,7	4,2	2,8
40	54	68,8	56	1,1	73	1	0,22	2,9	4,5	2,8
45	57,7	73,7	58	1,1	78	1	0,21	3	4,6	3,2
50	62,7	78,7	58	1,1	83	1	0,21	3	4,6	3,2
60	78	97,5	62	1,5	101	1,5	0,19	3,3	5,1	3,6

Self-aligning ball bearings on adapter sleeve
d_1 **17 – 45** mm



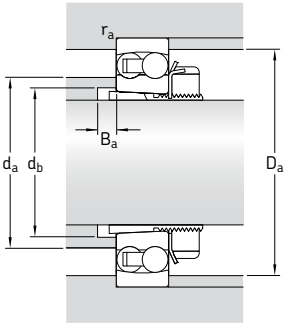
Open bearing



Sealed bearing

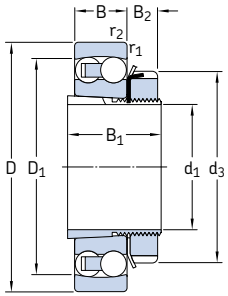
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed	Bearing + sleeve	Bearing	Adapter sleeve
d_1	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
17	47	14	12,7	3,4	0,18	32 000	20 000	0,16	**1204 EKTN9**	**H 204**
20	52	15	14,3	4	0,21	28 000	18 000	0,21	**1205 EKTN9**	**H 205**
	52	18	16,8	4,4	0,23	26 000	18 000	0,23	**2205 EKTN9**	**H 305**
	52	18	14,3	4	0,21	–	9 000	0,23	**2205 E-2RS1KTN9**	**H 305 C**
	62	17	19	5,4	0,28	22 000	15 000	0,33	**1305 EKTN9**	**H 305**
25	62	16	15,6	4,65	0,24	24 000	15 000	0,32	▸ **1206 EKTN9**	**H 206**
	62	20	23,8	6,7	0,35	22 000	15 000	0,36	**2206 EKTN9**	**H 306**
	62	20	15,6	4,65	0,24	–	7 500	0,36	**2206 E-2RS1KTN9**	**H 306 C**
	72	19	22,5	6,8	0,36	19 000	13 000	0,49	**1306 EKTN9**	**H 306**
	72	27	31,2	8,8	0,45	18 000	13 000	0,61	**2306 K**	**H 2306**
30	72	17	19	6	0,31	20 000	13 000	0,44	▸ **1207 EKTN9**	**H 207**
	72	23	30,7	8,8	0,46	18 000	12 000	0,54	**2207 EKTN9**	**H 307**
	72	23	19	6	0,31	–	6 300	0,55	**2207 E-2RS1KTN9**	**H 307 C**
	80	21	26,5	8,5	0,43	16 000	11 000	0,65	**1307 EKTN9**	**H 307**
	80	31	39,7	11,2	0,59	18 000	12 000	0,84	**2307 EKTN9**	**H 2307**
35	80	18	19,9	6,95	0,36	18 000	11 000	0,58	▸ **1208 EKTN9**	**H 208**
	80	23	31,9	10	0,51	16 000	11 000	0,58	**2208 EKTN9**	**H 308**
	80	23	19,9	6,95	0,36	–	5 600	0,67	**2208 E-2RS1KTN9**	**H 308 C**
	90	23	33,8	11,2	0,57	14 000	9 500	0,85	**1308 EKTN9**	**H 308**
	90	33	54	16	0,82	14 000	10 000	1,10	**2308 EKTN9**	**H 2308**
40	85	19	22,9	7,8	0,40	17 000	11 000	0,68	▸ **1209 EKTN9**	**H 209**
	85	23	32,5	10,6	0,54	15 000	10 000	0,78	**2209 EKTN9**	**H 309**
	85	23	22,9	7,8	0,40	–	5 300	0,76	**2209 E-2RS1KTN9**	**H 309 C**
	100	25	39	13,4	0,70	12 000	8 500	1,20	**1309 EKTN9**	**H 309**
	100	36	63,7	19,3	1	13 000	9 000	1,40	**2309 EKTN9**	**H 2309**
45	90	20	26,5	9,15	0,48	16 000	10 000	0,77	▸ **1210 EKTN9**	**H 210**
	90	23	33,8	11,2	0,57	14 000	9 500	0,87	**2210 EKTN9**	**H 310**
	90	23	22,9	8,15	0,42	–	4 800	0,84	**2210 E-2RS1KTN9**	**H 310 C**
	110	27	43,6	14	0,72	12 000	8 000	1,45	**1310 EKTN9**	**H 310**
	110	40	63,7	20	1,04	14 000	9 500	1,90	**2310 K**	**H 2310**

▸ Bearings and sleeves also available as KAM self-aligning ball bearing kits (→ **page 474**)

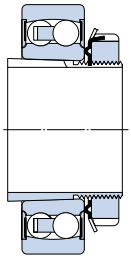


Dimensions						Abutment and fillet dimensions					Calculation factors			
d_1	d_3	D_1 ~	B_1	B_2	$r_{1,2}$ min	d_a max	d_b min	D_a max	B_a min	r_a max	e	Y_1	Y_2	Y_0
mm						mm					–			
17	32	41	24	7	1	28,5	23	41,4	5	1	0,30	2,1	3,3	2,2
20	38	45,6	26	8	1	33	28	46,4	5	1	0,28	2,2	3,5	2,5
	38	46,1	29	8	1	32	28	46,4	5	1	0,35	1,8	2,8	1,8
	38	46,3	29	9	1	31	28	46,4	5	1	0,28	2,2	3,5	2,5
	38	52,5	29	8	1,1	37	28	55	6	1	0,28	2,2	3,5	2,5
25	45	53	27	8	1	40	33	56,4	5	1	0,25	2,5	3,9	2,5
	45	55	31	8	1	38	33	56,4	5	1	0,33	1,9	3	2
	45	54,1	31	9	1	36	33	56,4	5	1	0,25	2,5	3,9	2,5
	45	60,9	27	8	1,1	44	33	65	6	1	0,25	2,5	3,9	2,5
	45	60,9	38	8	1,1	41	35	65	5	1	0,44	1,4	2,2	1,4
30	52	62,3	29	9	1,1	47	38	65	–	1	0,23	2,7	4,2	2,8
	52	64,2	35	9	1,1	45	39	65	5	1	0,31	2	3,1	2,2
	52	62,7	35	10	1,1	42	39	65	5	1	0,23	2,7	4,2	2,8
	52	69,5	35	9	1,5	51	39	71	7	1,5	0,25	2,5	3,9	2,5
	52	68,4	43	9	1,5	46	40	71	5	1,5	0,46	1,35	2,1	1,4
35	58	68,8	31	10	1,1	53	43	73	6	1	0,22	2,9	4,5	2,8
	58	71,6	36	10	1,1	52	44	73	6	1	0,28	2,2	3,5	2,5
	58	69,8	36	11	1,1	49	44	73	6	1	0,22	2,9	4,5	2,8
	58	81,5	36	10	1,5	61	44	81	6	1,5	0,23	2,7	4,2	2,8
	58	79,2	46	10	1,5	53	45	81	6	1,5	0,40	1,6	2,4	1,6
40	65	73,7	33	11	1,1	57	48	78	6	1	0,21	3	4,6	3,2
	65	74,6	39	11	1,1	55	50	78	8	1	0,26	2,4	3,7	2,5
	65	75,3	39	12	1,1	53	50	78	8	1	0,21	3	4,6	3,2
	65	89,5	39	11	1,5	67	50	91	6	1,5	0,23	2,7	4,2	2,8
	65	87,4	50	11	1,5	60	50	91	6	1,5	0,33	1,9	3	2
45	70	79,5	35	12	1,1	62	53	83	6	1	0,21	3	4,6	3,2
	70	81,5	42	12	1,1	61	55	83	10	1	0,23	2,7	4,2	2,8
	70	79,5	42	13	1,1	58	55	83	10	1	0,20	3,2	4,9	3,2
	70	95	42	12	2	70	55	99	6	2	0,24	2,6	4,1	2,8
	70	94,4	55	12	2	65	56	99	6	2	0,43	1,5	2,3	1,6

Self-aligning ball bearings on adapter sleeve
d_1 **50 – 80** mm



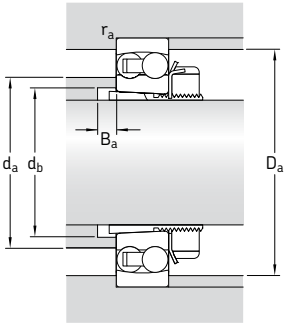
Open bearing



Sealed bearing

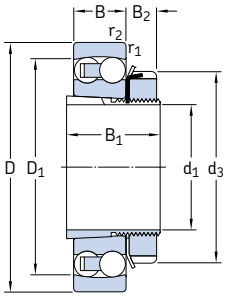
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed	Bearing + sleeve	Bearing	Adapter sleeve
d_1	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
50	100	21	27,6	10,6	0,54	14 000	9 000	0,99	▸ **1211 EKTN9**	**H 211**
	100	25	39	13,4	0,70	12 000	8 500	1,15	**2211 EKTN9**	**H 311**
	100	25	27,6	10,6	0,54	–	4 300	1,10	**2211 E-2RS1KTN9**	**H 311 C**
	120	29	50,7	18	0,92	11 000	7 500	1,90	**1311 EKTN9**	**H 311**
	120	43	76,1	24	1,25	11 000	7 500	2,40	**2311 K**	**H 2311**
55	110	22	31,2	12,2	0,62	12 000	8 500	1,20	**1212 EKTN9**	**H 212**
	110	28	48,8	17	0,88	11 000	8 000	1,45	**2212 EKTN9**	**H 312**
	110	28	31,2	12,2	0,62	–	3 800	1,40	**2212 E-2RS1KTN9**	**H 312 C**
	130	31	58,5	22	1,12	9 000	6 300	2,15	**1312 EKTN9**	**H 312**
	130	46	87,1	28,5	1,46	9 500	7 000	2,95	**2312 K**	**H 2312**
60	120	23	35,1	14	0,72	11 000	7 000	1,45	**1213 EKTN9**	**H 213**
	120	31	57,2	20	1,02	10 000	7 000	1,80	**2213 EKTN9**	**H 313**
	120	31	35,1	14	0,72	–	3 600	1,75	**2213 E-2RS1KTN9**	**H 313 C**
	140	33	65	25,5	1,25	8 500	6 000	2,85	**1313 EKTN9**	**H 313**
	140	48	95,6	32,5	1,66	9 000	6 300	3,60	**2313 K**	**H 2313**
65	130	25	39	15,6	0,80	10 000	6 700	2,00	**1215 K**	**H 215**
	130	31	58,5	22	1,12	9 000	6 300	2,30	**2215 EKTN9**	**H 315**
	160	37	79,3	30	1,43	8 000	5 600	4,20	**1315 K**	**H 315**
	160	55	124	43	2,04	7 500	5 600	5,55	**2315 K**	**H 2315**
70	140	26	39,7	17	0,83	9 500	6 000	2,40	**1216 K**	**H 216**
	140	33	65	25,5	1,25	8 500	6 000	2,85	**2216 EKTN9**	**H 316**
	170	39	88,4	33,5	1,50	7 500	5 300	5,00	**1316 K**	**H 316**
	170	58	135	49	2,24	7 000	5 300	7,10	**2316 K**	**H 2316**
75	150	28	48,8	20,8	0,98	9 000	5 600	2,95	**1217 K**	**H 217**
	150	36	58,5	23,6	1,12	8 000	5 600	3,30	**2217 K**	**H 317**
	180	41	97,5	38	1,70	7 000	4 800	6,00	**1317 K**	**H 317**
	180	60	140	51	2,28	6 700	4 800	8,15	**2317 K**	**H 2317**
80	160	30	57,2	23,6	1,08	8 500	5 300	3,50	**1218 K**	**H 218**
	160	40	70,2	28,5	1,32	7 500	5 300	5,50	**2218 K**	**H 318**
	190	43	117	44	1,93	6 700	4 500	6,90	**1318 K**	**H 318**
	190	64	153	57	2,50	6 300	4 500	9,80	**2318 KM**	**H 2318**

▸ Bearings and sleeves also available as KAM self-aligning ball bearing kits (→ **page 474**)

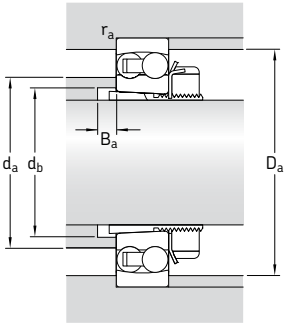


Dimensions						Abutment and fillet dimensions					Calculation factors			
d_1	d_3	D_1 ~	B_1	B_2	$r_{1,2}$ min	d_a max	d_b min	D_a max	B_a min	r_a max	e	Y_1	Y_2	Y_0
mm						mm					–			
50	75	88,4	37	12,5	1,5	70	60	91	7	1,5	0,19	3,3	5,1	3,6
	75	89,5	45	12,5	1,5	67	60	91	11	1,5	0,23	2,7	4,2	2,8
	75	88,5	45	13	1,5	65	60	91	11	1,5	0,19	3,3	5,1	3,6
	75	104	45	12,5	2	77	60	109	7	2	0,23	2,7	4,2	2,8
	75	103	59	12,5	2	72	61	109	7	2	0,40	1,6	2,4	1,6
55	80	97,6	38	12,5	1,5	78	64	101	7	1,5	0,19	3,3	5,1	3,6
	80	98,6	47	12,5	1,5	74	65	101	9	1,5	0,24	2,6	4,1	2,8
	80	97	47	13,5	1,5	73	65	101	9	1,5	0,19	3,3	5,1	3,6
	80	118	47	12,5	2,1	87	65	118	7	2	0,22	2,9	4,5	2,8
	80	112	62	12,5	2,1	76	66	118	7	2	0,33	1,9	3	2
60	85	106	40	13,5	1,5	85	70	111	7	1,5	0,18	3,5	5,4	3,6
	85	107	50	13,5	1,5	80	70	111	9	1,5	0,24	2,6	4,1	2,8
	85	106	50	14,5	1,5	79	70	111	7	1,5	0,18	3,5	5,4	3,6
	85	127	50	13,5	2,1	89	70	128	7	2	0,22	2,9	4,5	2,8
	85	122	65	13,5	2,1	85	72	128	7	2	0,37	1,7	2,6	1,8
65	98	116	43	14,5	1,5	93	80	121	7	1,5	0,17	3,7	5,7	4
	98	118	55	14,5	1,5	93	80	121	13	1,5	0,22	2,9	4,5	2,8
	98	138	55	14,5	2,1	104	80	148	7	2	0,22	2,9	4,5	2,8
	98	139	73	14,5	2,1	97	82	148	7	2	0,37	1,7	2,6	1,8
70	105	125	46	17	2	101	85	129	7	2	0,16	3,9	6,1	4
	105	127	59	17	2	99	85	129	13	2	0,22	2,9	4,5	2,8
	105	147	59	17	2,1	109	85	158	7	2	0,22	2,9	4,5	2,8
	105	148	78	17	2,1	104	88	158	7	2	0,37	1,7	2,6	1,8
75	110	134	50	18	2	107	90	139	8	2	0,17	3,7	5,7	4
	110	133	63	18	2	105	91	139	13	2	0,25	2,5	3,9	2,5
	110	155	63	18	3	117	91	166	8	2,5	0,22	2,9	4,5	2,8
	110	157	82	18	3	111	94	166	8	2,5	0,37	1,7	2,6	1,8
80	120	142	52	18	2	112	95	149	8	2	0,17	3,7	5,7	4
	120	142	65	18	2	112	96	149	11	2	0,27	2,3	3,6	2,5
	120	165	65	18	3	122	96	176	8	2,5	0,22	2,9	4,5	2,8
	120	164	86	18	3	115	100	176	8	2,5	0,37	1,7	2,6	1,8

Self-aligning ball bearings on adapter sleeve
d_1 **85 – 110** mm



Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass Bearing + sleeve	Designations Bearing	Adapter sleeve
d_1	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
85	170	32	63,7	27	1,20	8 000	5 000	4,25	**1219 K**	**H 219**
	170	43	83,2	34,5	1,53	7 000	5 000	5,30	**2219 KM**	**H 319**
	200	45	133	51	2,16	6 300	4 300	7,90	**1319 K**	**H 319**
90	180	34	68,9	30	1,29	7 500	4 800	5,00	**1220 K**	**H 220**
	180	46	97,5	40,5	1,76	6 700	4 800	6,40	**2220 KM**	**H 320**
	215	47	143	57	2,36	6 000	4 000	9,65	**1320 K**	**H 320**
	215	73	190	80	3,25	5 600	4 000	14,0	**2320 KM**	**H 2320**
100	200	38	88,4	39	1,60	6 700	4 300	6,80	**1222 K**	**H 222**
	200	53	124	52	2,12	6 000	4 300	8,85	**2222 KM**	**H 322**
	240	50	163	72	2,75	5 300	3 600	13,5	**1322 KM**	**H 322**
110	215	42	119	53	2,12	6 300	4 000	8,30	**1224 KM**	**H 3024**



Dimensions						Abutment and fillet dimensions					Calculation factors			
d_1	d_3	D_1 ~	B_1	B_2	$r_{1,2}$ min	d_a max	d_b min	D_a max	B_a min	r_a max	e	Y_1	Y_2	Y_0
mm						mm					–			
85	125	151	55	19	2,1	120	100	158	8	2	0,17	3,7	5,7	4
	125	151	68	19	2,1	118	102	158	10	2	0,27	2,3	3,6	2,5
	125	174	68	19	3	127	102	186	8	2,5	0,23	2,7	4,2	2,8
90	130	159	58	20	2,1	127	106	168	8	2	0,17	3,7	5,7	4
	130	160	71	20	2,1	124	108	168	9	2	0,27	2,3	3,6	2,5
	130	185	71	20	3	136	108	201	8	2,5	0,23	2,7	4,2	2,8
	130	186	97	20	3	130	110	201	8	2,5	0,37	1,7	2,6	1,8
100	145	176	63	21	2,1	140	116	188	8	2	0,17	3,7	5,7	4
	145	177	77	21	2,1	137	118	188	8	2	0,28	2,2	3,5	2,5
	145	206	77	21	3	154	118	226	10	2,5	0,22	2,9	4,5	2,8
110	145	190	72	22	2,1	150	127	203	12	2	0,19	3,3	5,1	3,6