

For New Technology Network

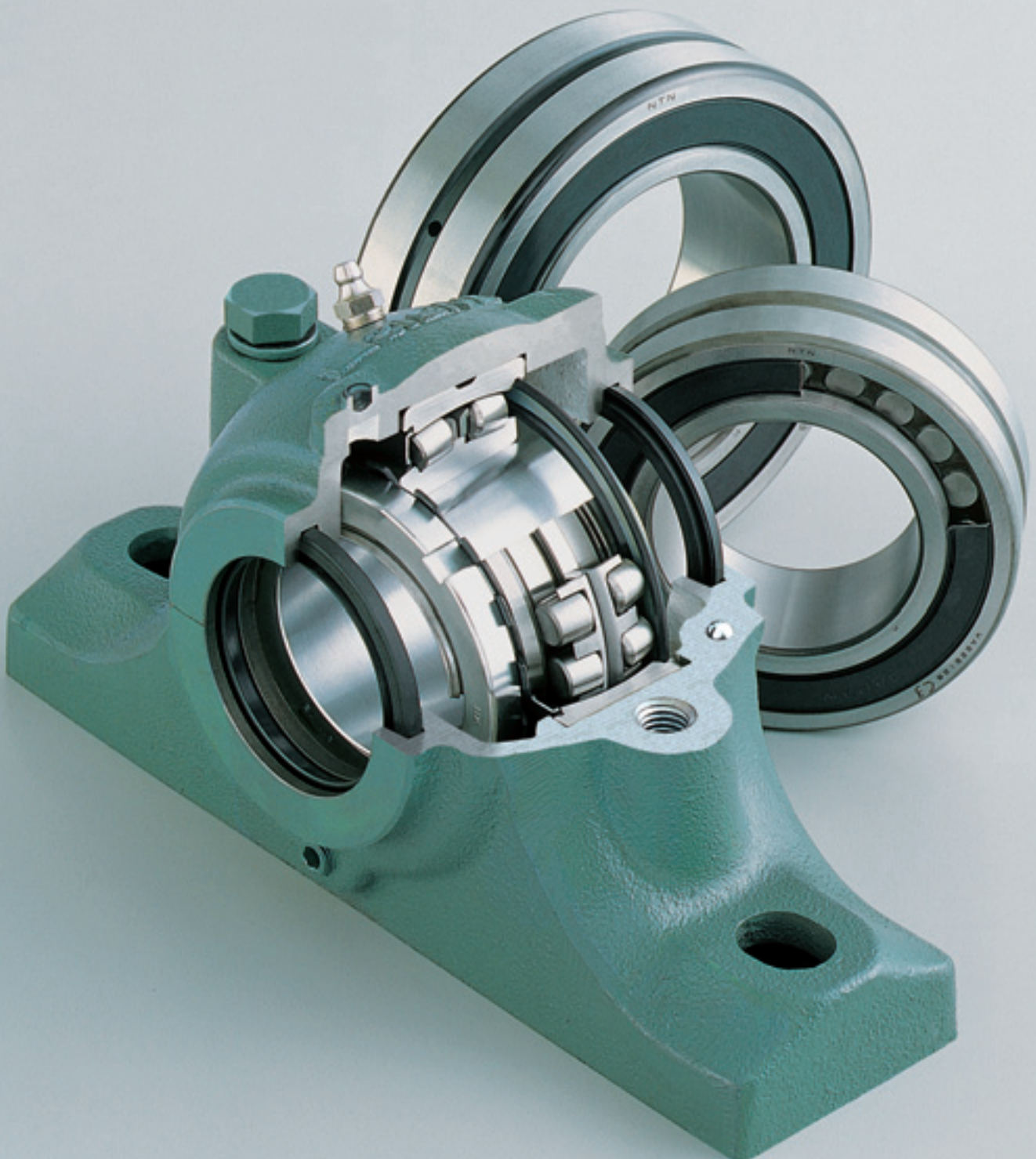
NTN®

NTNcorporation

Sealed Self-Aligning Roller Bearings - WA type

Patent Pending

CAT. No. 3702/E



NTN Sealed Self-Aligning Roller Bearings - WA type

Lengthens operating time between maintenance inspections in contaminated environments!



General

The high load capacity of self-aligning roller bearings and their easy adaptability to a variety of applications has led to increased use in nearly every industry. Compact sealed self-aligning roller bearings have been developed by NTN specifically to address the need for longer operating times between periodic maintenance inspections and relubrication. (Patent pending)

Special Characteristics

Highly efficient at preventing infiltration of contaminants

The adoption of a specially designed rubber contact seal dramatically increases contaminant-blocking efficiency compared to open-type seals. This also enables bearings to operate longer between maintenance inspections and relubrication.

Can be integrated into a standard plummer block

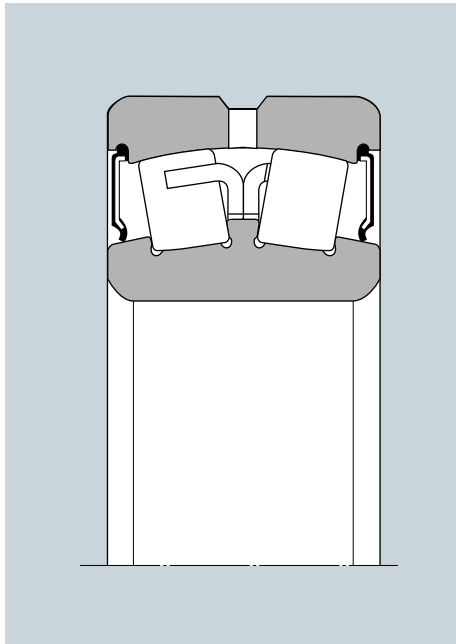
Standard type bearings in Series SN5 and SN2 can be integrated with a plummer block. However, when used for the fixed-side bearing, standard fixing rings can not be used; fixing rings with special width dimensions are necessary. (Refer to dimension tables.)

Although bearings are sealed, relubrication is possible

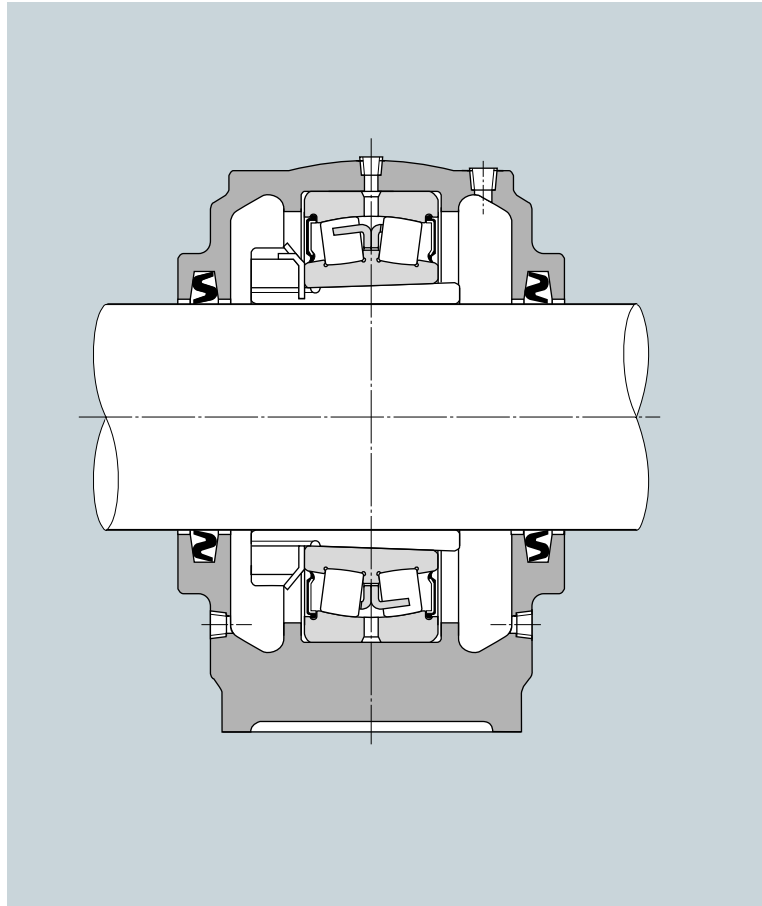
Outer rings are provided standard with oil grooves and oil holes enabling direct relubrication of inner bearing clearances. However, when a standard plummer block is used, the lubrication hole must be relocated. A specialized plummer block with relocated lubrication holes is available through NTN. (Refer to dimension tables.)

Seals remain secure even when the bearing accommodates misalignment

Allowable misalignment is $\pm 0.5^\circ$. Even when bearings move to accommodate misalignment within this range, seal lip contact pressure remains unchanged and continues to provide consistent performance.



Bearing diagram



Cross-sectional diagram of plummer block

Structure

- 1) Bore diameter and outer diameter dimensions are the same as Series 222; width dimensions are somewhat wider. Dimensional accuracy and running accuracy are JIS Class 0.
- 2) Internal dimensions are the same as Series 222B and therefore basic rated loads are also the same.
- 3) Outer rings are provided with oil grooves and oil holes standard.
- 4) Seals are designed to maintain an ideal degree of contact pressure with the outer surface of the inner ring.
- 5) The bearings are packed 25 - 35 % of inside free space of bearing with lithium mineral grease.

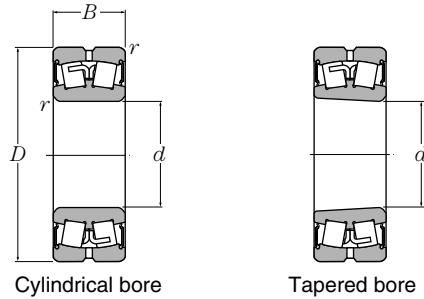
Allowable temperature range

Please use bearings within their allowable temperature range of -25 to +120°C.

Allowable rotational speeds

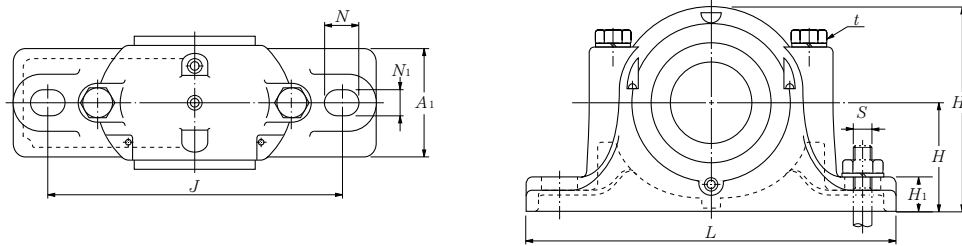
Relubrication type : $dn \leq 6 \times 10^4$ (with relubrication, 100% grease-packed)
 Pre packed type : $dn \leq 8 \times 10^4$ (with lubrication level as packed and shipped)
 (d = inner bore diameter dimension, mm) x (n = operating speed, rpm)

Sealed Self-Aligning Roller Bearings - WA type Dimension Table

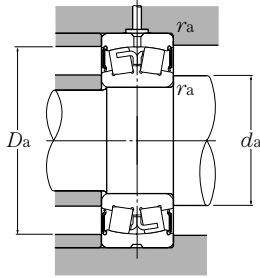


Bearing no.		Boundary dimensions mm				Basic load ratings			
Cylindrical bore	Tapered bore ^①	<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> _{min} ^②	Dynamic <i>C_r</i>	Static <i>C_{or}</i>	Dynamic <i>C_r</i>	Static <i>C_{or}</i>
						kN			
						kgf			
WA22212BLLS	WA22212BLLSK	60	110	36	1.5	115	147	11 700	15 000
WA22213BLLS	WA22213BLLSK	65	120	39	1.5	143	179	14 600	18 300
WA22214BLLS	WA22214BLLSK	70	125	39	1.5	154	201	15 700	20 500
WA22215BLLS	WA22215BLLSK	75	130	39	1.5	166	223	16 900	22 800
WA22216BLLS	WA22216BLLSK	80	140	41	2	179	239	18 300	24 400
WA22217BLLS	WA22217BLLSK	85	150	44	2	206	272	21 000	27 800
WA22218BLLS	WA22218BLLSK	90	160	50.4	2	256	345	26 200	35 000
WA22219BLLS	WA22219BLLSK	95	170	51	2.1	294	390	30 000	39 500
WA22220BLLS	WA22220BLLSK	100	180	60.3	2.1	315	415	32 000	42 500
WA22222BLLS	WA22222BLLSK	110	200	69.8	2.1	410	570	42 000	58 000
WA22224BLLS	WA22224BLLSK	120	215	76	2.1	485	700	49 500	71 500
WA22226BLLS	WA22226BLLSK	130	230	80	3	570	790	58 000	80 500
WA22228BLLS	WA22228BLLSK	140	250	88	3	685	975	70 000	99 500
WA22230BLLS	WA22230BLLSK	150	270	96	3	775	1 160	79 000	119 000
WA22232BLLS	WA22232BLLSK	160	290	104	3	870	1 290	88 500	132 000

Specialized Plummer Block - SN5XXL 10 Series Dimension Table



Bore dia <i>d</i> ₁	Bearing no.	Plummer block no.	Relubrication hole location drawing no.	Dimensions mm											
				<i>D</i>	<i>H</i>	<i>J</i>	<i>N</i> ₁	<i>N</i>	<i>A</i>	<i>L</i>	<i>A</i> ₁	<i>H</i> ₁	<i>H</i> ₂	<i>g</i>	<i>t</i> No.
55	WA22212BLLSK	SN512L10	1	110	70	210	18	23	105	255	70	30	135	38	M12
60	WA22213BLLSK	SN513L10	1	120	80	230	18	23	110	275	80	30	150	43	M12
65	WA22215BLLSK	SN515L10	1	130	80	230	18	23	115	280	80	30	155	41	M12
70	WA22216BLLSK	SN516L10	1	140	95	260	22	27	120	315	90	32	175	43	M16
75	WA22217BLLSK	SN517L10	1	150	95	260	22	27	125	320	90	32	185	46	M16
80	WA22218BLLSK	SN518L10	1	160	100	290	22	27	145	345	100	35	195	62.4	M16
85	WA22219BLLSK	SN519L10 ^③	1	170	112	290	22	27	140	345	100	35	210	53	M16
90	WA22220BLLSK	SN520L10	1	180	112	320	26	32	160	380	110	40	218	70.3	M20
100	WA22222BLLSK	SN522L10	1	200	125	350	26	32	175	410	120	45	240	80	M20
110	WA22224BLLSK	SN524L10	2	215	140	350	26	32	185	410	120	45	270	86	M20
115	WA22226BLLSK	SN526L10	2	230	150	380	28	36	190	445	130	50	290	90	M24
125	WA22228BLLSK	SN528L10	2	250	150	420	33	42	205	500	150	50	305	98	M24
135	WA22230BLLSK	SN530L10	2	270	160	450	33	42	220	530	160	60	325	106	M24
140	WA22232BLLSK	SN532L10	2	290	170	470	33	42	235	550	160	60	345	114	M24



Equivalent radial bearing load (dynamic)

$$P_r = XF_r + YF_a$$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

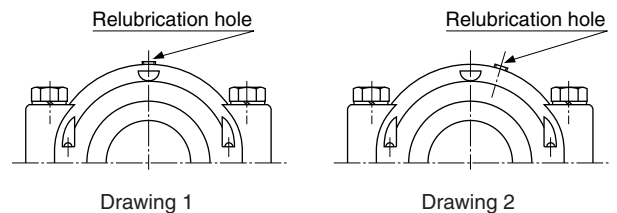
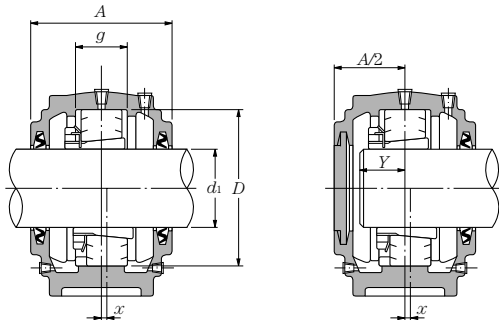
Equivalent radial bearing load (static)

$$P_{or} = F_r + Y_0 F_a$$

For values e , Y_1 , Y_2 , and Y_0 see table below.

Abutment and fillet dimensions mm				Constant	Axial load coefficient			Mass (ref.) kg	
Min.	Max.	Max.	Max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
68.5	74.5	101.5	1.5	0.27	2.49	3.71	2.44	1.41	1.37
73.5	80	111.5	1.5	0.28	2.42	3.60	2.37	1.80	1.76
78.5	84	116.5	1.5	0.26	2.55	3.80	2.50	1.91	1.86
83.5	89.5	121.5	1.5	0.24	2.81	4.19	2.75	2.06	2.00
90	94.5	130	2	0.26	2.64	3.93	2.58	2.51	2.45
95	101	140	2	0.26	2.60	3.88	2.55	3.08	3.01
100	107	150	2	0.26	2.55	3.80	2.49	4.08	3.97
107	114	158	2	0.26	2.63	3.92	2.57	4.71	4.59
112	119	168	2	0.26	2.55	3.80	2.49	6.01	5.83
122	133	188	2	0.27	2.51	3.74	2.46	8.87	8.60
132	147	203	2	0.27	2.47	3.68	2.42	11.2	10.9
144	154	216	2.5	0.28	2.39	3.56	2.33	12.5	12.1
154	168	236	2.5	0.28	2.39	3.55	2.33	16.9	16.3
164	185	256	2.5	0.27	2.46	3.66	2.40	22.6	21.9
174	197	276	2.5	0.28	2.42	3.60	2.37	28.0	27.2

- ① Bearings marked with a "K" have a 1/12 tapered bore.
- ② Minimum allowable value for chamfer dimension r .



Location of relubrication hole

Ref. dimension S No.	Mass kg (ref.)	Adapter ID no.	Fixing ring ID no. ①	Rings	Ref. dimension mm Y ②	Rubber seal ID no.
M16	4.5	H2312X	SRS110X2F	1	36	ZF12
M16	5.6	H2313X	SRS120X2F	2	36	ZF13
M16	6.0	H2315X	SRS130X2F	1	46	ZF15
M20	9.0	H2316X	SRS140X2F	1	46	ZF16
M20	9.3	H2317X	SRS150X2F	1	48	ZF17
M20	12	H2318X	SRS160X6	2	48	ZF18
M20	14	H2319X	SRS170X2F	1	52	ZF19
M24	17	H2320X	SRS180X5	2	52	ZF20
M24	20	H2322X	SRS200X5	2	58	ZF22
M24	23	H2324X	SRS215X5	2	62	ZF24
M24	29	H2326	SRS230X5	2	65	ZF26
M30	37	H2328	SR250X5	2	70	ZF28
M30	42	H2330	SRS270X5	2	76	ZF30
M30	48	H2332	SRS290X5	2	83	ZF32

① Values within the fixing ring ID no. represent the outer diameter and width dimensions. **However, standard fixing rings cannot be used.**

② SN519 is not a JIS type-number but does conform to JIS standards.

③ "Y" represents the ref. dimension for the distance from the bearing center to the shaft end in cases where shaft-end type is used.

Note : 1. SN524 and larger are supplied with an eye bolts for suspension purposes.

2. Oil supply valves sizes are as follows:

SN512 - SN522 PT 1/8
SN524 - SN532 PT 1/4

3. Dimension x indicates the degree to which the bearing center varies from the plummer block's center, and this value is 1/2 the fixing ring dimension.

4. Fixing ring material:

Width dimension of 2 : rolled structural steel (SS400).

Width dimension of 5, 6 : gray cast iron, type 3. (FC200)

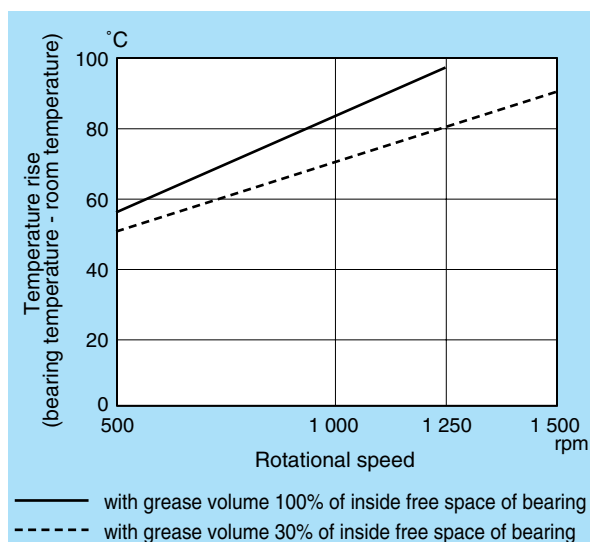
Performance Test Data

(1) Heat Run Test

Test conditions

Bearing	:WA22216BLLSK
Load	:radial load 980N {100kgf}
Lubrication	:grease (Alvania No. 3)
Injected grease volume	:30% of inside free space of bearing; 100% of inside free space of bearing
Room temperature	:25°C
Operating time	:Until temperature rise stabilizes

Test Results



(2) Dust Contamination Resistance Test

Test conditions

Bearing	:WA22216BLLSK (sealed type) 22216BK (open type)
Load	:radial load 196N {20kgf}
Rotational speed	:500 rpm
Lubrication	:grease (Alvania No. 3)
Dust	:breeze (20wt% mixed with grease inside housing)
Operating time	:760 hours (approx. 1 month)



Before the test

Test Results



Sealed-type bearing after testing
(unchanged from pre-test condition)



Open-type bearing after testing
(change in grease color due to contamination with breeze)

Handling Precautions

- (1) Because the internal radial clearance of sealed self-aligning roller bearings with tapered bores cannot be measured with a thickness gauge, please monitor clearances after assembly using the values for axial direction runout as shown in **Table 1**.
- (2) In cases where two fixing rings are used with a plummer block, please use one fixing ring on each side of the bearing.
- (3) During assembly, if misalignment exceeding the allowable misalignment angle of $\pm 0.5^\circ$ is applied to the bearing, rollers may come in direct contact with seals causing seal deformation. Furthermore, if additional force is applied under these conditions, seals may separate from the bearing entirely. Therefore, caution is advised.
- (4) Please be sure to apply plenty of grease to the inside free space of the plummer block when installing the bearing. (Refer to **Table 2** for recommended grease volumes.)
- (5) Please use Lithium mineral grease. For cases where other types of grease are to be used, please consult NTN.
- (6) If a shrink fit is to be applied, please do not exceed a bearing temperature of 100°C . However, these bearings cannot be shrink fit via immersion in a hot oil bath.

Table 1 Assembly of self-aligning roller bearings with tapered bores (1/12 taper, mm)

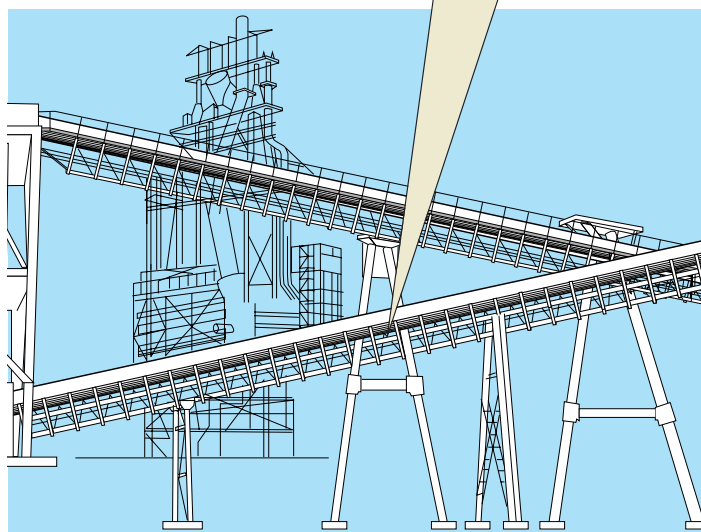
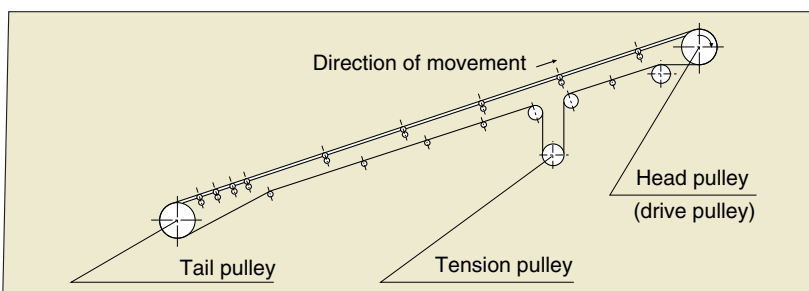
Nominal bore diameter d		Axial direction runout	
over	up to/incl	min.	max.
60	65	0.45	0.6
65	80	0.6	0.7
80	100	0.7	0.8
100	120	0.75	0.9
120	140	1.1	1.2
140	160	1.2	1.4

Table 2 Volume of applied grease

Bearing No.	Grease Vol. g
SN512	80~ 120
SN513	100~ 150
SN515	130~ 190
SN516	140~ 210
SN517	170~ 260
SN518	260~ 390
SN519	250~ 370
SN520	330~ 500
SN522	470~ 700
SN524	550~ 850
SN526	650~ 950
SN528	800~ 1 200
SN530	1 100~ 1 600
SN532	1 300~ 2 000

Example Applications

- Raw material conveyor systems
- Steel manufacturing plants
- Cement factories
- Thermoelectric power plants
- Mining facilities
- As well as many other types of applications



Raw material conveyor system



Bearing for pulley use (under actual operating conditions)