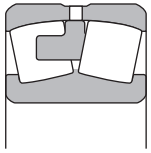
1. Features

The ULTAGE series spherical roller bearings with high-strength cage [EMA type] use dedicated machined brass cages. These bearings are suitable for mining machinery (vibrating screens, crushers, etc.), which experience eccentric rotation and impact loads.

Design	
Bearing series	Series 223 with bore diameter of 70 to 200 mm
Roller	Symmetrical
Cage type	Special machined cage

2. Accuracy and clearance (specification for vibrating screens)

The bore and outside diameter tolerance and the radial internal clearance are set for vibrating screens to obtain the desired operating clearance. See the table below for the specifications of the ULTAGE series spherical roller bearings for the bearing specifications (accuracy, clearance, etc.) to be used with vibrating screens.

Unit: mm

Dimensional tolerance of mean bore diameter within plane				Dimensional tolerance of mean outside diameter within plane				Radial internal clearance (cylindrical bore)					
Nominal bearing bore diameter		VS1, VS2		Nominal bearing outside diameter		VS1, VS2		Nominal bearing bore diameter		VS1		VS2	
Over	Incl.	Upper	Lower	Over	Incl.	Upper	Lower	Over	Incl.	Min.	Max.	Min.	Max.
	80	0	−0.010		150	−0.005	−0.013		65	0.075	0.090	0.100	0.120
80	120	0	−0.013	150	180	−0.005	−0.018	65	80	0.090	0.110	0.120	0.145
120	180	0	−0.015	180	315	−0.010	−0.023	80	100	0.110	0.135	0.150	0.180
180	200	0	−0.018	315	400	−0.013	−0.028	100	120	0.135	0.160	0.180	0.210
				400	420	−0.014	−0.030	120	140	0.160	0.190	0.205	0.240
								140	160	0.190	0.220	0.240	0.280
								160	180	0.200	0.240	0.260	0.310
								180	200	0.220	0.260	0.285	0.340

3. Part number

2 23 20 EMA K D1 VS1

- VS1 — Specification for vibrating screens (No code indicates general bearing clearance and accuracy.)
- D1 — Oil inlet/oil groove code (D1: with oil inlet/oil groove)
- K — Raceway shape code (No code: bore diameter cylindrical bore, K: bore diameter tapered bore)
- EMA — Type code
- 20 — Bore diameter No. (20: 100 mm)
- 23 — Dimension series code
- 2 — Bearing type code (2: spherical roller bearing)

4. Allowable axial load

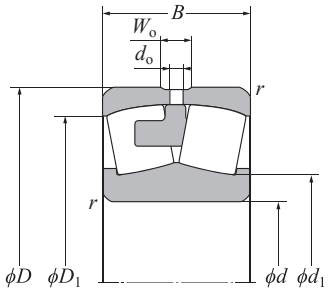
$F_a / F_r \leq e$
F_a : Axial load
F_r : Radial load
e : Constant (see dimension table)

If this bearing type is used for a vertical shaft or under a large axial load, the load on the rollers of the row that is not subject to the axial load can become small. This small load on the rollers can result in skidding of the rollers, which can cause bearing damage. If the ratio of the radial load exceeds the factor e in the dimension table ($F_a / F_r > e$), consult **NTN** Engineering.

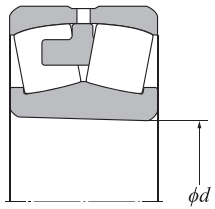
5. Allowable misalignment angle

Normal load or more ····· 1/115 (mm/mm)
Light load ····· 1/30 (mm/mm)

∗1. For a rough estimate of normal loads and light loads, see Note 1 in General Description A-81.
∗2. Misalignment beyond the above limits may cause the roller to protrude from the outer ring, causing interference with the peripheral components.



Cylindrical bore



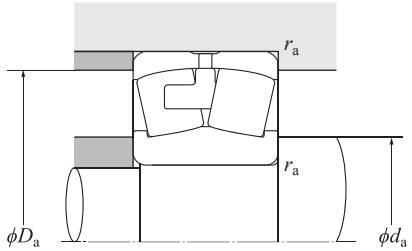
Tapered bore

Number of oil inlets on outer ring

Nominal bearing outside diameter D mm		Number of oil inlets Z_o
Incl.	Below	
—	320	4
320	—	8

Boundary dimensions mm						Basic load rating kN		Fatigue load limit kN	Allowable speed min^{-1}	Bearing number
						dynamic	static		Oil lubrication	Cylindrical bore
d	D	B	$r_{s\,min}$[1]	W_o	d_o	C_r	C_{0r}	C_u		
70	150	51	2.1	10	5	397	368	24.2	4 700	**22314EMAD1**
75	160	55	2.1	10	5	464	434	27.6	4 400	**22315EMAD1**
80	170	58	2.1	10	5	512	485	30.2	4 100	**22316EMAD1**
85	180	60	3	11	5	538	524	31.5	3 900	**22317EMAD1**
90	190	64	3	12	5	632	605	37.1	3 700	**22318EMAD1**
95	200	67	3	12	6	658	650	37.6	3 500	**22319EMAD1**
100	215	73	3	13	6	743	731	43.4	3 300	**22320EMAD1**
110	240	80	3	16	7	869	833	50.5	3 000	**22322EMAD1**
120	260	86	3	18	8	1 060	1 120	59.8	2 700	**22324EMAD1**
130	280	93	4	19	9	1 260	1 310	72.6	2 500	**22326EMAD1**
140	300	102	4	19	9	1 400	1 500	77.7	2 400	**22328EMAD1**
150	320	108	4	20	9	1 570	1 640	85.7	2 200	**22330EMAD1**
160	340	114	4	20	10	1 760	1 940	95.6	2 100	**22332EMAD1**
170	360	120	4	20	10	2 010	2 320	107	1 900	**22334EMAD1**
180	380	126	4	21	10	2 190	2 460	115	1 800	**22336EMAD1**
190	400	132	5	21	10	2 370	2 750	128	1 700	**22338EMAD1**
200	420	138	5	21	10	2 590	3 140	140	1 600	**22340EMAD1**

1) Smallest allowable dimension for chamfer dimension *r*.



Dynamic equivalent radial load

$P_r = XF_r + YF_a$

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

Static equivalent radial load

$P_{0r} = F_r + Y_0F_a$

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

Bearing number	Installation-related dimensions mm					Constant	Axial load factors			Mass (approx.) kg	
Tapered bore[2]	d_1	d_a Min.	D_a Max.	D_1	r_{as} Max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
22314EMAKD1	85	82	138	131	2.1	0.34	2.00	2.98	1.96	4.34	4.25
22315EMAKD1	91	87	148	139	2.1	0.34	2.00	2.98	1.96	5.30	5.19
22316EMAKD1	98	92	158	148	2.1	0.34	2.00	2.98	1.96	6.32	6.19
22317EMAKD1	107	99	166	157	3	0.32	2.09	3.11	2.04	7.19	7.05
22318EMAKD1	110	104	176	166	3	0.33	2.06	3.06	2.01	8.58	8.41
22319EMAKD1	120	109	186	174	3	0.32	2.09	3.11	2.04	9.80	9.60
22320EMAKD1	127	114	201	187	3	0.34	1.98	2.94	1.93	12.8	12.5
22322EMAKD1	139	124	226	209	3	0.32	2.09	3.11	2.04	17.3	16.9
22324EMAKD1	156	134	246	225	3	0.32	2.09	3.11	2.04	22.5	22.0
22326EMAKD1	164	147	263	243	4	0.33	2.06	3.06	2.01	28.4	27.8
22328EMAKD1	181	157	283	261	4	0.33	2.03	3.02	1.98	34.6	33.8
22330EMAKD1	188	167	303	279	4	0.34	2.00	2.98	1.96	41.9	41.0
22332EMAKD1	205	177	323	296	4	0.33	2.03	3.02	1.98	50.1	49.1
22334EMAKD1	223	187	343	313	4	0.32	2.09	3.11	2.04	59.7	58.5
22336EMAKD1	229	197	363	329	4	0.32	2.09	3.11	2.04	69.3	67.9
22338EMAKD1	247	210	380	346	5	0.32	2.12	3.15	2.07	81.0	79.4
22340EMAKD1	265	220	400	364	5	0.31	2.15	3.20	2.10	94.1	92.2

2) "K" indicates bearings having a tapered bore with a taper ratio of 1:12.

Special Application Bearings