

NTN[®]

Spherical Roller Bearings for Vibrating Screens

Cat. No. A-1800



SPHERICAL ROLLER BEARINGS

FOR VIBRATING SCREENS

Quick Look

- Bearings take very heavy loads, including impact loads
- Extra load created by higher "g" forces present
- Heavy loads equal higher shaft and housing deflections
- Bearings are subjected to high speed and are in a contaminated area
- Vibrating screen bearings in 22300 and 23300 series

Vibrating Screens are also known as Shaker Screens. Bearings in these applications are subjected to very severe operating conditions. The shaking action of the screen subjects the bearings to very heavy loads including impact loads. Additional loading on the bearing is created by the higher "g" forces generated by higher acceleration present in the application. Heavy loads result in higher shaft and housing deflections. This requires the bearing to accommodate the resulting misalignment. Bearings are also subjected to higher speeds and contaminated environments.

NTN has designed a special line of spherical roller bearings to operate under very severe operating conditions present in vibrating screen applications. Special features in NTN bearings, as described in the benefits and features chart, result in higher bearing life and less equipment down time.

Special NTN spherical roller bearings for vibrating screen applications are available in 22300 and 23300 series. These bearings

are available in two configurations, B type and UA type as described below. The UA type is designed for heavy load applications.

Adding suffix VS1 or VS2 to the standard part number will automatically provide the necessary bearing for vibrating screen applications.

VS1: In addition to the other features listed in the benefits and features chart, it includes a special specification for radial internal clearance. The clearance range is similar to C3, but the lower third of the C3 range is eliminated for better control of the bearing clearance after mounting.

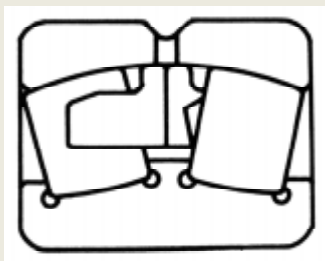
Examples: 22313BVS1, 22318UAVS1

VS2: In addition to the other features listed in the benefits and features chart, it includes a special specification for radial internal clearance. The clearance range is similar to C4, but the lower third of the C4 range is eliminated for better control of the bearing clearance after mounting.

Examples: 22313BVS2, 22318UAVS2

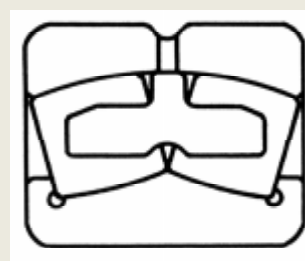
Special Spherical Roller Bearings

B Type (Standard)



1. Well suited for applications with radial and thrust loads.
2. Integral ribs and inner raceway insure proper roller guidance even at high speed.
3. Outer ring guided machined brass cage for impact resistance

UA Type (High Capacity)



1. Longer than standard roller length for greater load capacity.
2. Center rib is eliminated to allow longer rollers.
3. Rotating torque is minimized by roller-to-roller rolling contact.
4. Outer ring guided machined brass cage for impact resistance

Note: In the UA Type, each roller inner end is in rolling contact with the adjacent roller of the other row. This design reduces internal friction and wear.

TOLERANCES

The special tolerances of the bore, OD, and radial internal clearances are designed to accommodate the heavy press fits typically used for the vibrating screen application. This results in **a more consistent radial clearance after mounting.**

Reduced Bore Tolerance	
Bore Diameter	Bore Tolerance (mm)
$d \leq 80$ mm	0 ~ -0.010
$80 < d \leq 120$ mm	0 ~ -0.013
$120 < d \leq 180$ mm	0 ~ -0.015
$180 < d \leq 200$ mm	0 ~ -0.018

Reduced OD Tolerance	
Nominal OD	OD Tolerance (mm)
$D \leq 150$ mm	-0.005 ~ -0.013
$150 < D \leq 180$ mm	-0.005 ~ -0.018
$180 < D \leq 315$ mm	-0.010 ~ -0.023
$315 < D \leq 400$ mm	-0.013 ~ -0.028

Special Radial Clearance		
Bore Diameter	Radial Clearance VS1 Suffix (0.001 mm)	Radial Clearance VS2 Suffix (0.001 mm)
$d \leq 65$ mm	75 ~ 90	100 ~ 120
$65 < d \leq 80$ mm	90 ~ 110	120 ~ 145
$80 < d \leq 100$ mm	110 ~ 135	150 ~ 180
$100 < d \leq 120$ mm	135 ~ 160	180 ~ 210
$120 < d \leq 140$ mm	160 ~ 190	205 ~ 240
$140 < d \leq 160$ mm	190 ~ 220	240 ~ 280
$160 < d \leq 180$ mm	200 ~ 240	260 ~ 310
$180 < d \leq 200$ mm	220 ~ 260	285 ~ 340

SHAFT & HOUSING FITS

The required fits between the bearing inner and outer ring diameter surfaces and their mating parts depends on application conditions. Bearings in vibrating screen applications are subjected to higher impact loads. **Special fits are required to prevent inner and outer ring creep.** Shaft diameter and housing bore diameter recommended for normal vibrating screen applications are given in the tables below. For specific fit recommendations, please contact NTN engineering.

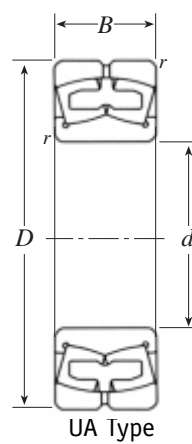
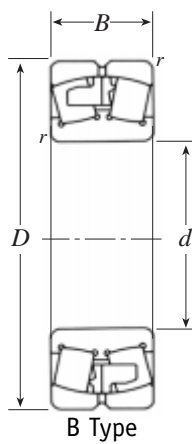
Recommended Shaft Diameters			
Nominal Diameter (mm)		Shaft Diameter Tolerance* (0.001 mm)	
over	incl	max	min
30	50	0	-16
50	80	0	-19
80	120	0	-22
120	180	0	-25
180	250	0	-29

Recommended Housing Bore Diameters			
Outer Ring Diameter (mm)		Housing Bore** (0.001 mm)	
over	incl	max	min
50	80	-21	-51
80	120	-24	-59
120	180	-28	-68
180	250	-33	-79
250	315	-36	-88
315	400	-41	-98
400	500	-45	-108

* Shaft fit code h6

** Housing fit code P7

Note: It is recommended that the shaft roundness and cylindricity be less than half the shaft diameter tolerance and the housing bore roundness and cylindricity error be less than half the housing bore diameter tolerance.



Equivalent Bearing Load

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y ₁	0.67	Y ₂

Bearing Load Formulas

Dynamic	Static
$P_r = XF_r + YF_a$	$P_{or} = F_r + Y_oF_a$

Bearing	Boundary Dimensions				Load Ratings		Constant	Axial Load Factor			Mass kg
	d	D	B	r _s min	Dynamic C _r	Static C _{or}		Y ₁	Y ₂	Y ₀	
22308C	40	90	33	1.5	121	128	0.38	1.76	2.62	1.72	.974
22309C	45	100	36	1.5	148	167	0.36	1.86	2.77	1.82	1.33
22310C	50	110	40	2	186	212	0.37	1.80	2.69	1.76	1.79
22311B	55	120	43	2	204	234	0.40	1.68	2.50	1.64	2.30
22312B	60	130	46	2.1	238	273	0.42	1.62	2.42	1.59	2.90
22313B	65	140	48	2.1	265	320	0.38	1.79	2.67	1.75	3.45
22314UA	70	150	51	2.1	340	410	0.31	2.14	3.19	2.10	4.48
22315UA	75	160	55	2.1	385	495	0.32	2.11	3.14	2.06	5.56
22316UA	80	170	58	2.1	420	525	0.31	2.14	3.19	2.10	6.55
22317UA	85	180	60	3	455	570	0.31	2.19	3.25	2.14	7.59
22318UA	90	190	64	3	520	650	0.31	2.16	3.21	2.11	9.00
23318B	90	190	73	3	495	650	0.42	1.63	2.42	1.59	9.59
22319UA	95	200	67	3	565	720	0.31	2.18	3.25	2.14	10.4
22320UA	100	215	73	3	675	865	0.32	2.13	3.18	2.09	13.3
22322UA	110	240	80	3	835	1090	0.33	2.03	3.02	1.98	18.3
23322B	110	240	92.1	3	815	1110	0.43	1.59	2.36	1.55	20.2
22324UA	120	260	86	3	945	1230	0.31	2.16	3.22	2.11	23.0
23324B	120	260	106	3	905	1250	0.44	1.54	2.29	1.51	26.6
22326UA	130	280	93	4	1090	1440	0.32	2.14	3.19	2.09	28.7
23326B	130	280	112	4	1060	1480	0.44	1.52	2.27	1.49	32.3
22328UA	140	300	102	4	1280	1710	0.32	2.09	3.11	2.04	36.1
23328B	140	300	118	4	1120	1600	0.42	1.60	2.38	1.56	38.8
22330UA	150	320	108	4	1430	2040	0.32	2.10	3.13	2.05	43.4
23330B	150	320	128	4	1280	1830	0.43	1.58	2.35	1.54	47.8
22332UA	160	340	114	4	1530	2210	0.32	2.12	3.16	2.08	51.6
23332B	160	340	136	4	1580	2300	0.43	1.58	2.35	1.54	57.7
22334UA	170	360	120	4	1720	2520	0.32	2.13	3.17	2.08	60.7
22336UA	180	380	126	4	1920	2920	0.32	2.14	3.19	2.09	71.4
22338UA	190	400	132	5	2090	3200	0.31	2.16	3.22	2.11	82.6
22340UA	200	420	138	5	2230	3400	0.31	2.16	3.22	2.11	95.4

Note: 40, 45 and 50 mm bore bearings use the C design, which is similar to the B design. The only difference is that the inner ring flange is like a floating guide ring and is not an integral part of the ring.

NTN BEARING FEATURES AND BENEFITS CHART

VIBRATING SCREENS

UA - TYPE SPHERICAL ROLLER BEARINGS FOR VIBRATING SCREEN APPLICATIONS

Feature	NTN	Benefit
1. Extra capacity bearing with larger rollers	✓	<ul style="list-style-type: none"> • Longer bearing life
2. Roller ends designed for minimum rolling friction	✓	<ul style="list-style-type: none"> • Improves lubrication and lowers operating temperatures
3. Brass cage with heavy section thickness improves roller guidance	✓	<ul style="list-style-type: none"> • Reduces friction • Longer bearing life
4. Outer ring riding cage improves roller guidance	✓	<ul style="list-style-type: none"> • Less cage wear and longer bearing life
5. Open-end cage design	✓	<ul style="list-style-type: none"> • Improves bearing lubrication
6. Circumferential lubrication groove and holes in outside diameter of the bearing	✓	<ul style="list-style-type: none"> • Improves bearing lubrication
7. No flange in the center of inner ring	✓	<ul style="list-style-type: none"> • Improves bearing lubrication
8. Reduced tolerance for bearing bore; lower half of the standard bore tolerance has been eliminated	✓	<ul style="list-style-type: none"> • Consistent shaft fit for uniform bearing mounting on the shaft • Contributes to increased resistance to heavy impact loads
9. Reduced tolerance on bearing outside diameter	✓	<ul style="list-style-type: none"> • Consistent housing fit for uniform bearing mounting in the housing • Contributes to increased resistance to heavy impact loads
10. Reduced C3 or C4 bearing clearance tolerance; lower 1/3 of the standard C3 or C4 clearance has been eliminated	✓	<ul style="list-style-type: none"> • Ensures uniform clearance under all loading and mounting conditions • Better load sharing among rollers for longer life
11. High quality vacuum degassed, roll forged steel	✓	<ul style="list-style-type: none"> • Consistently higher bearing life

Note: Features one and two are not available in the B type design.

Vibrating Screen Bearing Interchange

NTN	FAG	SKF	TORRINGTON
22308CVS2	22308ES.TVPB.T41A / 22308EAS.MA.T41A	452308CACM2/W502	22308W22BRC4
22309CVS2	22309ES.TVPB.C4.F80 / 22309EAS.MA.T41A	452309CACM2/W502	22309YMW33W800C4
22310CVS2	22310ES.TVPB.C4.F80 / 22310EAS.MA.T41A	452310CACM2/W502	22310YMW33W800C4
22311BVS2	22311ES.TVPB.C4.F80 / 22311EAS.MA.T41A	452311CACM2/W502	22311YMW33W800C4
22312BVS2	22312EAS.MA.C4.F80 / 22312EAS.MA.T41A	452312CACM2/W502	22312YMW33W800C4
22313BVS2	22313ES.TVPB.C4.F80 / 22313EAS.MA.T41A	452313CACM2/W502	22313YMW33W800C4
22314UAVS2	22314ES.TVPB.C4.F80 / 22314EAS.MA.T41A	452314CACM2/W502	22314YMW33W800C4
22315UAVS2	22315AS.MA.C4F80 / 22315EAS.MA.T41A	452315CACM2/W502	22315YMW33W800C4
22316UAVS2	22316ES.TVPB.C4.F80 / 22316EAS.MA.T41A	452316CACM2/W502	22316YMW33W800C4
22317UAVS2	22317EAS.MA.C4.F80 / 22317EAS.MA.T41A	452317CACM2/W502	22317YMW33W800C4
22318UAVS2	22318EAS.MA.C3.F80 / 22318EAS.MA.T41A	452318CACM2/W502	22318YMW33W800C4
22319UAVS2	22319ES.TVPB.C4.F80 / 22319EAS.MA.T41A	452319CACM2/W502	22319YMW33W800C4
22320UAVS2	22320EAS.MA.C4.F80 / 22320EAS.MA.T41A	452320CACM2/W502	22320YMW33W800C4
22322UAVS2	22322EAS.MA.C4.F80 / 22322EAS.MA.T41A	452322CACM2/W502	22322YMW33W800C4
22324UASV2	22324ES.TVPB.C4.F80 / 22324EAS.MA.T41A	452324CACM2/W502	22324YMW33W800C4
22326UAVS2	22326EAS.MA.C4.F80 / 22326EAS.MA.T41A	452326CACM2/W502	22326YMW33W800C4
22328UAVS2	22328ES.TVPB.C4.F80 / 22328EAS.MA.T41A	452328CACM2/W502	22328YMW33W800C4
22330UAVS2	22330EAS.MA.C4.F80 / 22330EAS.MA.T41A	452330CACM2/W502	22330YMW33W800C4
22332UAVS2	22332A.MA.C4.F80.W207BB / 22332A.MA.T41A	452332CACM2/W502	22332YMW33W800C4
22334UAVS2	22334ES.TVPB.C4.F80 / 22334A.MA.T41	452334CACM2/W502	22334YMW33W800C4
22336UAVS2	22336A.MA.C4F80 / 22336A.MA.T41A	452336CACM2/W502	22336YMW33W800C4
22338UAVS2	22338A.MA.C4.F80 / 22338A.MA.T41A	452338CACM2/W502	22338YMW33W800C4
22340UAVS2	22340A.MA.C4.F80 / 22340A.MA.T41A	452340CACM2/W502	22340YMW33W800C4
23318BVS2	22318EAS.MA.T41A	453318CACM2/W502	23318YMW33W800C4
23322BVS2	22322EAS.MA.T41A	453322CACM2/W502	23322YMW33W800C4
23324BVS2	23324EAS.MA.T41A	453324CACM2/W502	23324YMW33W800C4
23326BVS2	23326EAS.MA.T41A	453326CACM2/W502	23326YMW33W800C4
23328BVS2	23328EAS.MA.T41A	453328CACM2/W502	23328YMW33W800C4
23330BVS2	23330EAS.MA.T41A	453330CACM2/W502	23330YMW33W800C4
23332BVS2	23332EAS.MA.T41A	453332CACM2/W502	23332YMW33W800C4

Note: For vibrating screen manufacturers' interchange, please consult NTN engineering.

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