NTN

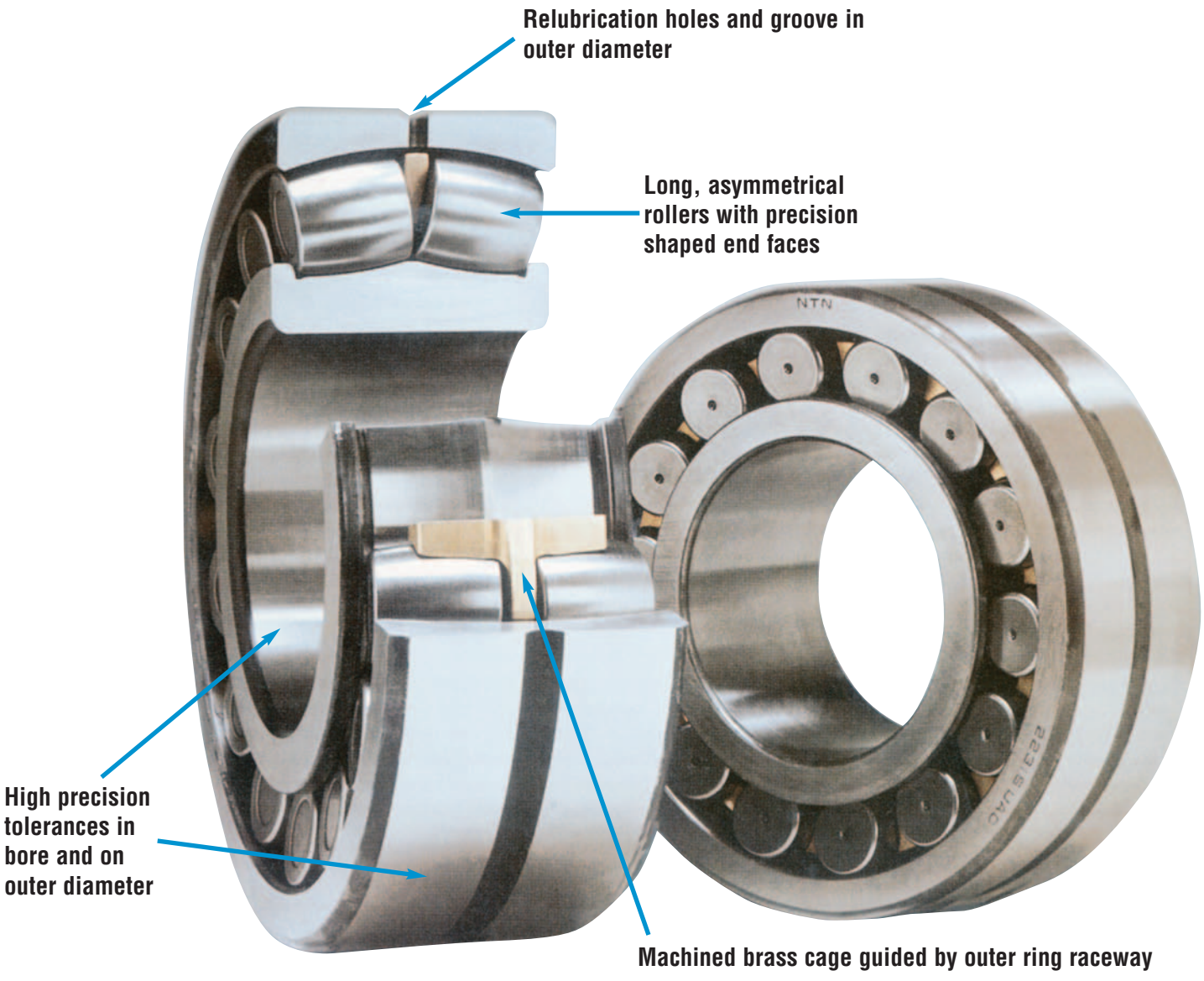
NTN corporation

SPHERICAL ROLLER BEARINGS FOR VIBRATING SCREENS

CAT.No. C-4100

Spherical Roller bearings for Vibrating Screens

Robust bearings for vibrating screen applications

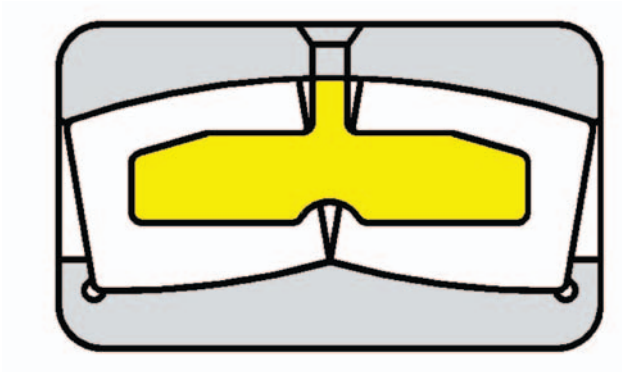


Specially developed for severe conditions present in vibrating screen applications.

Technical Data

Spherical Roller Bearings for Vibrating Screens

ROBUST BEARINGS FOR VIBRATING SCREEN APPLICATIONS



Vibrating screens, also known as shaker screens, subject bearings to extreme operating conditions. High "g" forces due to constant acceleration and impact from material on the bed require bearings with extra capacity and robust cages. The high loads cause deflection of the shafts and housings so the bearings must accommodate misalignment in operation. Lastly, the application subjects the bearings to high speeds and highly contaminated environments so the bearings must operate smoothly and have minimal friction.

"I CHOOSE NTN VIBRATING SCREEN BEARINGS FOR THEIR QUALITY. THEY ALSO BACK UP THEIR PRODUCT WITH EXCELLENT SERVICE."

Leigh Marshall – Marshall's Aggregate Equipment repair

Applications

These bearings can be used in mining, construction, aggregate, asphalt recycling, steel manufacturing, and general industrial equipment where heavy loads, vibration, and impact loads are common. Typical examples include vibrating screens and crushers.

NTN has designed a special line of spherical roller bearings to operate under the very severe conditions present in vibrating screen applications. Special features in these bearings, such as longer asymmetrical rollers, finger-type machined brass cages, and positive roller guidance, result in higher bearing life, cooler operation, and less equipment down time. These bearings are available in the 22300 line of spherical roller bearings and are indicated with a UA/VS suffix.

BEARING FEATURES:

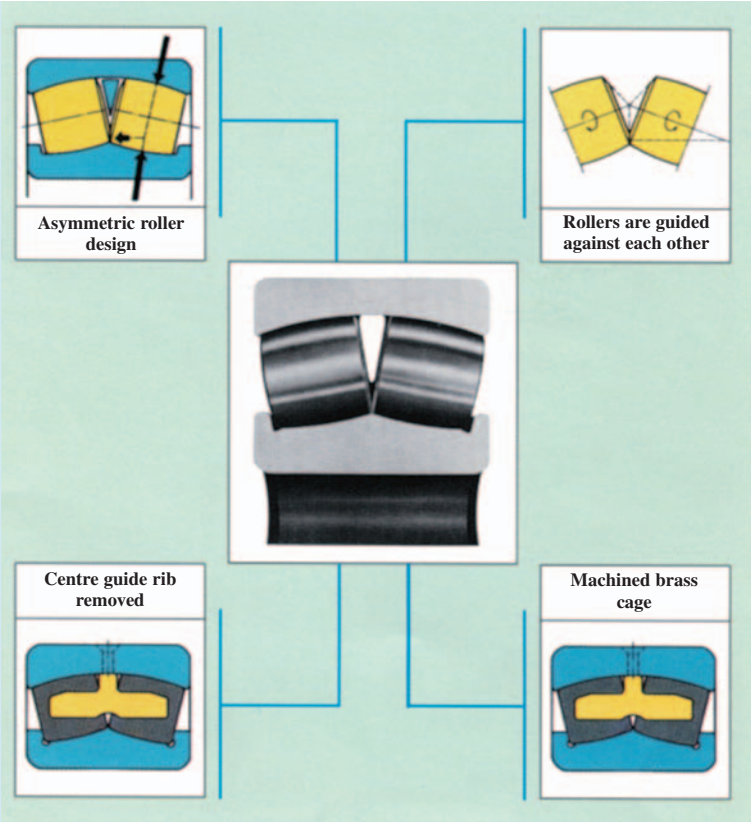
Asymmetric Rollers

- asymmetric rollers create positive seating of the roller ends against each other
- better roller guidance
- reduced roller skewing

High Capacity

- no centre guide rib allows for longer rollers
- higher bearing capacity equates to longer life
- bearing life doubled compared to standard

Note: if the axial load exceeds 30% of the radial load, consult NTN Engineering.



Roller Guidance

- roller ends contact each other in the centre
- roller ends shaped to provide support
- low rolling friction
- improves lubrication and lowers operating temperature

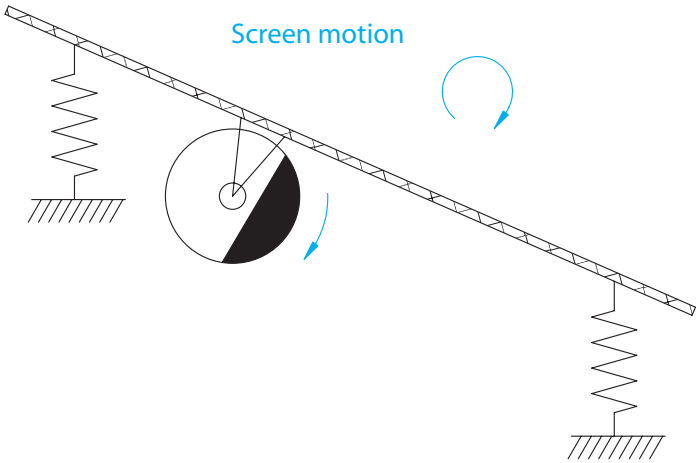
Cage Design

- one-piece machined brass cage is guided on the outer ring for impact resistance and improved lubrication
- brass lowers sliding friction and absorbs vibration
- finger-type cage allows lubricant to penetrate the bearing and flush out contamination

Principal Screen Types:

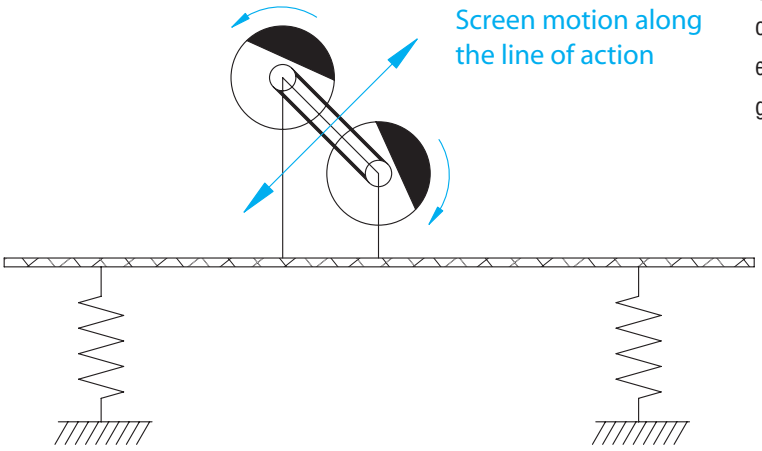
Two Bearing (Unbalanced) Screens

These are the simplest of vibrating screens: they have a single shaft with an eccentric mass that rotates to induce vibration. The screen frame is supported on springs to allow it to move freely in a circular motion. The screens have to be inclined as these machines rely on gravity to convey oversized material along the screen.



Double Shaft (Straight Line Motion) Screens

These screens have the advantage that they can operate horizontally and take up less headroom as a result. They utilize two shafts with eccentric masses that rotate in opposite directions, synchronized with gears or a chain drive. The result is that the rotating masses cancel each other out except along a single line of action. This causes the screen to move in a linear fashion; by tilting the line of action to 45°, oversized material is conveyed along the screen. There are also triple-shaft variations on this design that develop elliptical motion.



Four Bearing (Single Shaft) Screens

The principle behind this type of screen is similar to the two bearing, single shaft screen except that the shaft is machined eccentric and two more bearings are added to attach the offset portion of the shaft to the screen frame. As the shaft rotates, the eccentric shaft forces the frame through the circular motion defined by the degree of eccentricity. The action resembles that of a crankshaft. In order to balance the motion of the frame, counter-balance weights are added to the shaft between the outboard shaft support bearings and the eccentric bearings. Although still found in the field, these types of screens are no longer commonly manufactured.

Lubrication

Vibrating screen bearings generally operate in highly contaminated environments under heavy load and shock load. As a result, good lubrication, whether oil or grease, is essential. For both, a minimum base oil viscosity of 20cSt (100 SUS) is required at the operating temperature and either mineral or synthetic base oils can be used. It is generally best to provide for a viscosity 2-3 times the minimum as a safety factor.

With grease, a lubricant with corrosion inhibitors and extreme pressure (EP) additives is necessary to minimize wear and prolong bearing life. A consistency grade of NLGI 2, or preferably NLGI 3, is recommended. It is important to use the same grease for re-lubrication as was originally packed in the bearing. Most screen plant manufacturers recommend a re-lubrication interval of 40-50 hours; based on an 8-10 hour working day, this means weekly greasing. Greases containing molybdenum disulphide (MoS_2) are not recommended.

Oil lubrication can have many forms: oil bath, circulating oil, oil splash, oil mist. Selection is based on viscosity and additives as well as the lubrication system in use. Oil changes must be conducted regularly (excepting oil mist) but the interval is determined by experience. The condition should be monitored closely until the proper interval is established. Consult the operating manual for your machine for initial guidelines.

Tolerances – VS specifications

The special, tighter tolerances of the bore, outer diameter, and radial internal clearance are designed to accommodate the heavy press fits typically used for vibrating screen applications. This results in a more consistent, optimized radial internal clearance after mounting to maximize fatigue life.

Inner ring bore diameter dimension tolerance Unit:mm

Nominal bore d	VS2 specifications
$d \leqq 80$	0 ~ –0.010
$80 < d \leqq 120$	0 ~ –0.013
$120 < d \leqq 180$	0 ~ –0.015
$180 < d \leqq 200$	0 ~ –0.018

Outer ring outer diameter dimension tolerance Unit: mm

Nominal outer diameter D	VS2 specifications
$D \leqq 150$	–0.005 ~ –0.013
$150 < D \leqq 180$	–0.005 ~ –0.018
$180 < D \leqq 315$	–0.010 ~ –0.023
$315 < D \leqq 400$	–0.013 ~ –0.028
$400 < D \leqq 420$	–0.014 ~ –0.030

Bearing internal radial clearance Unit: mm

Nominal bore d	VS2 specifications
$d \leqq 65$	0.100 ~ 0.120
$65 < d \leqq 80$	0.120 ~ 0.145
$80 < d \leqq 100$	0.150 ~ 0.180
$100 < d \leqq 120$	0.180 ~ 0.210
$120 < d \leqq 140$	0.205 ~ 0.240
$140 < d \leqq 160$	0.240 ~ 0.280
$160 < d \leqq 180$	0.260 ~ 0.310
$180 < d \leqq 200$	0.285 ~ 0.340

Shaft and Housing Fits

Bearings in vibrating screen applications are subject to impact loads and rotating loads – special fits are required to prevent inner and outer ring creep. Shaft diameter and housing bore diameter tolerances are given below for two-bearing screens, double- and triple-shaft screens, and the eccentric bearings in four-bearing screens. The outboard bearings on four-bearing screens are generally standard spherical roller bearings and use conventional fits as given in the NTN Ball and Roller Bearings catalogue. For other applications, please consult NTN Engineering. At each bearing replacement, the shaft and housing should be visually checked for fretting corrosion and wear; preferably, dimensions should be checked as well as using micrometers.

Shaft diameter dimension tolerance Unit: mm (in.)

Nominal bore d	g6 specifications
$d \leqq 80$	–0.010 ~ –0.029 –0.0004 ~ –0.0011
$80 < d \leqq 120$	–0.012 ~ –0.034 –0.0005 ~ –0.0013
$120 < d \leqq 180$	–0.014 ~ –0.039 –0.0006 ~ –0.0015
$180 < d \leqq 200$	–0.015 ~ –0.044 –0.0006 ~ –0.0017

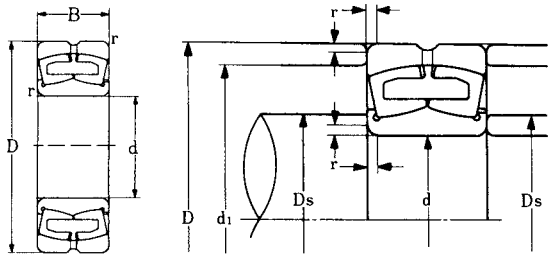
Housing bore diameter dimension tolerance Unit: mm (in.)

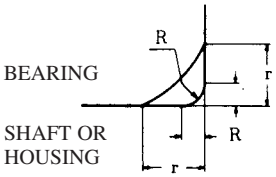
Nominal diameter D	P6 specifications
$d \leqq 180$	–0.036 ~ –0.061 –0.0014 ~ –0.0024
$180 < d \leqq 250$	–0.041 ~ –0.070 –0.0016 ~ –0.0028
$250 < d \leqq 315$	–0.047 ~ –0.079 –0.0019 ~ –0.0031
$315 < d \leqq 400$	–0.051 ~ –0.087 –0.0020 ~ –0.0034
$400 < d \leqq 500$	–0.055 ~ –0.095 –0.0022 ~ –0.0037

"WE RELY ON NTN VIBRATING SCREEN BEARINGS FOR THEIR RELIABILITY AND SMOOTH OPERATION IN OUR SCREEN PLANTS"

Greg Flanigan – Service Manager, ELRUS Aggregate Systems

Dimension Table





Dynamic Equivalent Radial Load

Pr = XFr + YFa

Fa/Fr ≤ e		Fa/Fr > e	
X	Y	X	Y
1	Y1	0.67	Y2

Static Equivalent Radial Load

For values of e, Y1, Y2 and Y0 see the table below.

Dimensions				Basic Load Ratings		Limiting speeds RPM		Bearing Numbers	Constant	Axial Load Factors			Other Dimensions			Weight kg
				dyn	stat								Ds	d1	R	
d	D	B	r	C	Co	grease	oil		e	Y1	Y2	Y0	min	max	max	
70	150	51	3.5	340	410	1,900	2,800	22314UA	0.31	2.14	3.19	2.10	82	138	2	4.48
75	160	55	3.5	385	495	1,800	2,600	22315UA	0.32	2.11	3.14	2.06	87	148	2	5.56
80	170	58	3.5	420	525	1,700	2,400	22316UA	0.31	2.14	3.19	2.10	92	158	2	6.55
85	180	60	4	455	570	1,600	2,300	22317UA	0.31	2.19	3.25	2.14	99	166	2.5	7.59
90	190	64	4	520	650	1,500	2,200	22318UA	0.31	2.16	3.21	2.11	104	176	2.5	9.00
95	200	67	4	565	720	1,400	2,000	22319UA	0.31	2.18	3.25	2.14	109	186	2.5	10.4
100	215	73	4	675	865	1,300	1,900	22320UA	0.32	2.13	3.18	2.09	114	204	2.5	13.3
110	240	80	4	835	1,090	1,200	1,700	22322UA	0.33	2.03	3.02	1.98	124	226	2.5	18.3
120	260	86	4	945	1,230	1,100	1,600	22324UA	0.31	2.16	3.22	2.11	134	246	2.5	23.0
130	280	93	5	1,090	1,440	1,000	1,500	22326UA	0.32	2.14	3.19	2.09	148	262	3	28.7
140	300	102	5	1,280	1,710	940	1,300	22328UA	0.32	2.09	3.11	2.04	158	282	3	36.1
150	320	108	5	1,430	2,040	880	1,300	22330UA	0.32	2.10	3.13	2.05	168	302	3	43.4
160	340	114	5	1,530	2,210	810	1,200	22332UA	0.32	2.12	3.16	2.08	178	322	3	51.6
170	360	120	5	1,720	2,520	760	1,100	22334UA	0.32	2.13	3.17	2.08	188	342	3	60.7
180	380	126	5	1,920	2,920	720	1,000	22336UA	0.32	2.14	3.19	2.09	198	362	3	71.4
190	400	132	6	2,090	3,200	670	960	22338UA	0.31	2.16	3.22	2.11	212	378	4	82.6
200	420	138	6	2,230	3,400	640	910	22340UA	0.31	2.16	3.22	2.11	222	398	4	95.4

Vibrating screen bearings can also be used in:

- Hammer mills
- Jaw crushers
- cone crushers
- pulverizers

Interchanges Vibrating Screen Bearing

NTN	TORRINGTON	FAG	SKF
22314UAVS2	22314 YMW33W800C4	22314 EAS.MA.T41A	22314 E/VA405
22314UAVS2		22314 E1.T41A	452314M2/W502
22315UAVS2	22315 YMW33W800C4	22315 EAS.MA.T41A	22315 EJA/VA405
22315UAVS2		22315 E1.T41A	452315 M2/W502
22316UAVS2	22316 YMW33W800C4	22316 EAS.MA.T41A	22316 EJA/VA405
22316UAVS2		22316 E1.T41A	452316 M2/W502
22317UAVS2	22317 YMW33W800C4	22317 EAS.MA.T41A	22317 EJA/VA405
22317UAVS2		22317 E1.T41A	452317 M2/W502
22318UAVS2	22318 YMW33W800C4	22318 EAS.MA.T41A	22318 EJA/VA405
22318UAVS2		22318 E1.T41A	452318 M2/W502
22319UAVS2	22319 YMW33W800C4	22319 EAS.MA.T41A	22319 EJA/VA405
22319UAVS2		22319 E1.T41A	452319 M2/W502
22320UAVS2	22320 YMW33W800C4	22320 EAS.MA.T41A	22320 EJA/VA405
22320UAVS2		22320 E1.T41A	452320 M2/W502
22322UAVS2	22322 YMW33W800C4	22322 EAS.MA.T41A	22322 EJA/VA405
22322UAVS2		22322 E1.T41A	452322 M2/W502
22324UAVS2	22324 YMW33W800C4	22324 EAS.MA.T41A	22324 CCJA/W33VA405
22324UAVS2		22324 E1.T41A	452324 M2/W502
22326UAVS2	22326 YMW33W800C4	22326 EAS.MA.T41A	22326 CCJA/W33VA405
22326UAVS2		22326 E1.T41A	452326 M2/W502
22328UAVS2	22328 YMW33W800C4	22328 EAS.MA.T41A	22328 CCJA/W33VA405
22328UAVS2		22328 E1.T41A	452328 M2/W502
22330UAVS2	22330 YMW33W800C4	22330 EAS.MA.T41A	22330 CCJA/W33VA405
22330UAVS2		22330 E1.T41A	452330 M2/W502
22332UAVS2	22332 YMW33W800C4	22332 A.MA.T41A	22332 CCJA/W33VA405
22332UAVS2		22332 E1.T41A	452332 M2/W502
22334UAVS2	22334 YMW33W800C4	22334 A.MA.T41A	22334 CCJA/W33VA405
22334UAVS2		22334 E1.T41A	452334 M2/W502
22336UAVS2	22336 YMW33W800C4	22336 A.MA.T41A	22336 CCJA/W33VA405
22336UAVS2		22336 E1.T41A	452336 M2/W502
22338UAVS2	22338 YMW33W800C4	22338 A.MA.T41A	22338 CCJA/W33VA405
22338UAVS2		22338 E1.T41A	452338 M2/W502
22340UAVS2	22340 YMW33W800C4	22340 A.MA.T41A	22340 CCJA/W33VA405
22340UAVS2		22340 E1.T41A	452340 M2/W502

Note: Please consult NTN Engineering for vibrating screen manufacturers' interchange.

You may also be interested in the following NTN products:

Heavy Duty Blocks – SPW and SFCW Type

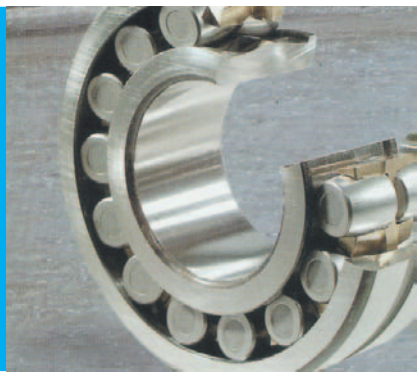
- Sealed spherical roller bearing unit blocks for demanding North American applications
- One-piece ductile iron pillow blocks and piloted flange blocks
- Can be made fixed or floating simply
- Patented sealed spherical roller bearing inserts are easily replaced without being open to contaminated environments
- SPW blocks fit SN, SNA and SNH footprint and base-to-centre height
- SPAW blocks fit SAF footprint and base-to-centre height
- Available with taconite service seals for the most severe applications
- Proven through years of performance and user satisfaction
- For more information see catalogue C-2600-III

Ultra-Class Bearing Units

- Feature-rich, high performance ball bearing mounted units
- Most common styles of heavy duty cast iron housings with solid base: pillow block, low base pillow block, 4-bolt flange and 2-bolt flange
- NTN exclusive ball point set screws for positive locking
- Available with set-screw or eccentric collar lock
- Precision honed raceways for long life and quiet operation
- Positive sealing by wiper seals with protective flingers
- For more information, see catalogue A-1400-II

NOTES

Spherical Roller Bearings for Vibrating Screens



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