

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.

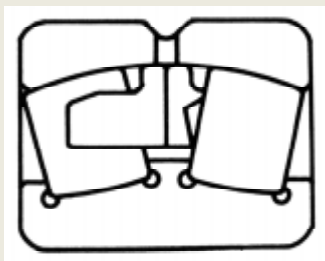
Examples: 22313BVS1, 22318UAVS1

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

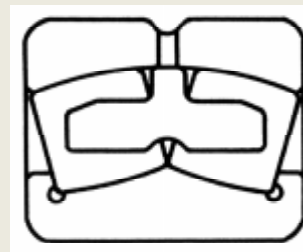
Special Spherical Roller Bearings

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.

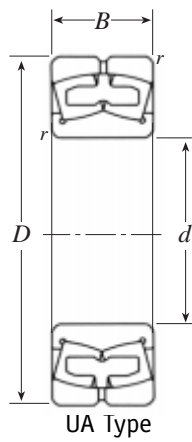
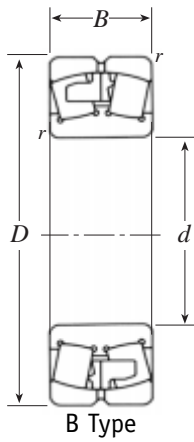
| Recommended Shaft Diameters | | | |
|-----------------------------|------|--------------------------------------|-----|
| Nominal Diameter (mm) | | Shaft Diameter Tolerance* (0.001 mm) | |
| over | incl | max | min |
| 30 | 50 | 0 | -16 |
| 50 | 80 | 0 | -19 |
| 80 | 120 | 0 | -22 |
| 120 | 180 | 0 | -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 |
|---------------------|-------------------------|
| $P_R = XF_R + YF_a$ | $P_{Or} = F_r + Y_0F_a$ |

| Bearing | Boundary Dimensions | | | | Load Ratings | | Constant | Axial Load Factor | | | Mass |
|---------|---------------------|-----|------|--------------------|--------------|------------|----------|-------------------|----------------|----------------|------|
| | mm | | | | kN | | | e | Y ₁ | Y ₂ | |
| | d | D | B | r _s min | Dynamic Cr | Static Cor | | | | | kg |
| 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.

Contact Information

www.ntnamerica.com

| | | |
|---------------------------|--|--------------------|
| Corporate Office | 1600 East Bishop Court, Mt. Prospect, Illinois 60056 | Phone 800-468-6528 |
| Central Region | 111 West Washington Street, Suite 310, East Peoria, Illinois 61611 | Phone 800-545-0434 |
| Eastern Region | 650 Pennsylvania Avenue, Exton, Pennsylvania 19341 | Phone 800-394-4686 |
| Great Lakes Region | 1600 East Bishop Court, Mt. Prospect, Illinois 60056 | Phone 800-252-8123 |
| Southeast Region | 5475 Peachtree Industrial Boulevard, Norcross, Georgia 30071 | Phone 800-241-0568 |
| Western Region | 2551 S.W. Grapevine Parkway, Grapevine, Texas 76051 | Phone 800-441-0825 |
| Automotive Group | 39255 West 12 Mile Road, Farmington Hills, Michigan 48331 | Phone 800-929-3892 |