Long-Life
Self-Lubricating
Spherical Bearings
Long-Life Self-Lubricating Spherical Bearings Featuring NHBB’s MK Liner System

Introducing the industry’s first self-lubricating liner system to qualify to the new performance threshold of 100,000 cycles for spherical bearing life, established by industry standard AS81820 Type A.

NHBB’s MK liner system utilizes PTFE to provide the long life and wear resistant surface required of Type A spherical bearings. Spherical bearings with the MK liner system offer the performance advantage of extended life at high loads in demanding aerospace applications such as flight controls, wing surface controls, actuators, landing gear, engine pylons, and engine mounts.

Increased Design Flexibility and Longer Lasting Performance

Self-lubricating spherical bearings with the MK liner system:
- Are interchangeable with existing products
- Are qualified to the same wear limits as non Type A bearings, but at four times the bearing life
- Uniquely meet both the new AS81820 Type A standard and the non Type A standard.

Engineering Support

For NHBB, the MK liner represents our ability to meet customers’ exacting specifications and anticipate their needs. While we are well positioned to provide the industry’s first series of long-life self-lubricating spherical bearings, we are dedicated to supporting our customers through the design and production of custom bearings, next-up assemblies, and machined parts. Please contact Astro’s sales or engineering teams for assistance with your specific requirements.

Interactive Site Visits

Need us to take a closer look? NHBB’s Product Engineering team regularly travels to our customers’ facilities to provide direct support in developing engineered solutions for any challenge. For more information, please contact NHBB’s Product Engineering team at the Astro Division. 603.524.0004. email: info@nhbb.com.

Test Parameters:
1. Conditions: Room temperature, dry
2. Oscillation angle: +/- 25°
3. Frequency: 20-30 cycles per minute

NHBB also holds qualification to the AS81820 Type A lined bore series – M81820/1A, M81820/2A, and M81820/4A.
**Spherical Bearings – Long-Life, Self-Lubricating**

**AS81820 Type A**

![Diagram of spherical bearings](image)

**Narrow Series**

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>V-GROOVED*</th>
<th>(B) BORE DIA.</th>
<th>(D) OUTSIDE DIA.</th>
<th>(W) BALL WIDTH</th>
<th>(T) RACE WIDTH</th>
<th>(Q) SHOULDIER DIA.</th>
<th>BALL DIA.</th>
<th>(E) PITCH DIA.</th>
<th>(P) GROOVE DEPTH</th>
<th>(Q) MIS-ALIGNMENT DEGREE</th>
<th>LIMIT STATIC RADIAL LOAD LBS.</th>
<th>LIMIT STATIC AXIAL LOAD LBS.</th>
<th>DYNAMIC OSC. RADIAL LOAD LBS.</th>
<th>WEIGHT LBS.</th>
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<tbody>
<tr>
<td>MS14101A</td>
<td>+0.0000</td>
<td>+0.0000</td>
<td>+0.000</td>
<td>±0.005</td>
<td>MIN.</td>
<td>REF.</td>
<td>+0.000</td>
<td>+0.000</td>
<td>+0.010</td>
<td>REF.</td>
<td>REF.</td>
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<tr>
<td>MB3V</td>
<td>-3</td>
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<td>0.5625</td>
<td>0.281</td>
<td>0.218</td>
<td>0.293</td>
<td>0.437</td>
<td>0.500</td>
<td>0.025</td>
<td>10°</td>
<td>3.975</td>
<td>150</td>
<td>1.500</td>
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<td>MB4V</td>
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<td>0.2500</td>
<td>0.6562</td>
<td>0.343</td>
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<td>0.364</td>
<td>0.531</td>
<td>0.594</td>
<td>0.025</td>
<td>10°</td>
<td>6.040</td>
<td>430</td>
<td>3.320</td>
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<td>MB5V</td>
<td>-5</td>
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<td>0.7500</td>
<td>0.375</td>
<td>0.281</td>
<td>0.419</td>
<td>0.562</td>
<td>0.650</td>
<td>0.035</td>
<td>10°</td>
<td>8.750</td>
<td>700</td>
<td>5.460</td>
<td>0.30</td>
</tr>
<tr>
<td>MB5V (VA)</td>
<td>-5A</td>
<td>0.3125</td>
<td>0.7500</td>
<td>0.375</td>
<td>0.281</td>
<td>0.419</td>
<td>0.562</td>
<td>0.660</td>
<td>0.035</td>
<td>10°</td>
<td>8.750</td>
<td>700</td>
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<td>MB6V</td>
<td>-6</td>
<td>0.3750</td>
<td>0.8125</td>
<td>0.406</td>
<td>0.312</td>
<td>0.475</td>
<td>0.656</td>
<td>0.712</td>
<td>0.035</td>
<td>9°</td>
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<td>0.4375</td>
<td>0.9062</td>
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<td>0.343</td>
<td>0.530</td>
<td>0.718</td>
<td>0.806</td>
<td>0.035</td>
<td>8°</td>
<td>13.200</td>
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<td>1.0000</td>
<td>0.500</td>
<td>0.390</td>
<td>0.600</td>
<td>0.813</td>
<td>0.876</td>
<td>0.055</td>
<td>8°</td>
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<td>10.400</td>
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<td>1.0937</td>
<td>0.562</td>
<td>0.437</td>
<td>0.670</td>
<td>0.875</td>
<td>0.970</td>
<td>0.055</td>
<td>8°</td>
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<td>0.500</td>
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<td>0.968</td>
<td>1.063</td>
<td>0.055</td>
<td>8°</td>
<td>30.500</td>
<td>4,720</td>
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<td>0.7500</td>
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<td>0.750</td>
<td>0.593</td>
<td>0.920</td>
<td>1.187</td>
<td>1.313</td>
<td>0.055</td>
<td>8°</td>
<td>46.400</td>
<td>6,750</td>
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<td>0.875</td>
<td>0.703</td>
<td>0.980</td>
<td>1.312</td>
<td>1.438</td>
<td>0.055</td>
<td>8°</td>
<td>62.200</td>
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<td>30.250</td>
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<td>1.7500</td>
<td>1.000</td>
<td>0.797</td>
<td>1.118</td>
<td>1.500</td>
<td>1.626</td>
<td>0.055</td>
<td>9°</td>
<td>82.200</td>
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<td>38.000</td>
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<td>1.1250</td>
<td>2.1250</td>
<td>1.125</td>
<td>0.900</td>
<td>1.334</td>
<td>1.750</td>
<td>2.003</td>
<td>0.055</td>
<td>8°</td>
<td>105.880</td>
<td>15,300</td>
<td>42.350</td>
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<td>MB20V</td>
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<td>1.2500</td>
<td>2.3125</td>
<td>1.250</td>
<td>1.000</td>
<td>1.473</td>
<td>1.937</td>
<td>2.190</td>
<td>0.055</td>
<td>8°</td>
<td>131.230</td>
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<td>1.3750</td>
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<td>1.375</td>
<td>1.100</td>
<td>1.654</td>
<td>2.156</td>
<td>2.440</td>
<td>0.055</td>
<td>8°</td>
<td>161.700</td>
<td>20,750</td>
<td>64.680</td>
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<td>-24</td>
<td>1.5000</td>
<td>2.8125</td>
<td>1.500</td>
<td>1.200</td>
<td>1.794</td>
<td>2.344</td>
<td>2.690</td>
<td>0.055</td>
<td>8°</td>
<td>191.973</td>
<td>24,950</td>
<td>77.110</td>
<td>4.70</td>
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*For chamfered version, delete "v" from part number.

**Notes:**
1. Bearing sizes -3 through -16 are approved for procurement to AS81820 Type A and Aerospace Standards AS14101 through AS14104.
2. Bearing sizes -18 through -24 are not included in current Aerospace Standards, but are offered as NHBB catalog items only.
3. Operating temperature range per AS81820 Type A is -65 to +325 °F. Broader temperature capabilities are achievable.
4. All dimensions are in inches unless otherwise specified.

**Materials**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Ball</th>
<th>Race</th>
<th>Liner</th>
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<tr>
<td>Catalog No</td>
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<tr>
<td>CRES 440C</td>
<td>CRES 17-4PH</td>
<td>PTFE/Fabric</td>
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<tr>
<td>AMS 5630</td>
<td>AMS 5643</td>
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<tr>
<td>55-62 HRC</td>
<td>28-37 HRC</td>
<td>No Lub. Required</td>
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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>CRES PH13-8Mo</td>
<td>CRES 17-4PH</td>
<td>PTFE/Fabric</td>
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<tr>
<td>43-47 HRC</td>
<td>28-37 HRC</td>
<td>No Lub. Required</td>
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</table>

**nhbb.com**

**Astro Division**

4
AS81820 Type A

Spherical Bearings – Long-Life, Self-Lubricating

**NHBB P/N**

**NO LETTER INDICATES STANDARD RACE DIAMETER**

**'T' INDICATES .010 OVERSIZE RACE DIAMETER (FOR REPAIR ONLY)**

**'U' INDICATES .020 OVERSIZE RACE DIAMETER (FOR REPAIR ONLY)**

**LETTER 'K' INDICATES LOW BREAKAWAY TORQUE**

**NO LETTER INDICATES STANDARD BREAKAWAY TORQUE**

**LETTER 'P' INDICATES CADMIUM PLATING**

**LETTER 'Z' INDICATES ZINC-NICKEL PLATING**

**LETTER 'E' INDICATES ZINC-NICKEL PLATING ONLY**

**NO LETTER INDICATES STANDARD BREAKAWAY TORQUE**

**LETTER 'K' INDICATES LOW BREAKAWAY TORQUE**

**NO LETTER INDICATES NO PLATING**

**LETTER 'P' INDICATES CADMIUM PLATING ONLY**

**NO LETTER INDICATES 440C BALL MATERIAL**

**LETTER 'C' INDICATES PH13-8Mo BALL MATERIAL**

**NO LETTER INDICATES CHAMFERED OUTER RACE (MS14102A & MS14104A)**

**LETTER 'V' INDICATES V-GROOVED OUTER RACE (MS14101A & MS14103A)**

**BORE DIAMETER IN MULTIPLES OF 1/16 INCHES**

**NO LOAD BREAKAWAY TORQUE**

**Radial and Axial Play**

**P/N Series MS14101A & MS14104A**

<table>
<thead>
<tr>
<th>Bore Size</th>
<th>Max. Radial Play (in.)</th>
<th>Max. Axial Play (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3K-12K</td>
<td>.0007</td>
<td>.0028</td>
</tr>
<tr>
<td>14K-16K</td>
<td>.0010</td>
<td>.0040</td>
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**P/N Series MS14102A & MS14103A**

<table>
<thead>
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<th>Bore Size</th>
<th>Max. Radial Play (in.)</th>
<th>Max. Axial Play (in.)</th>
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</thead>
<tbody>
<tr>
<td>3K-12K</td>
<td>.0007</td>
<td>.0021</td>
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<tr>
<td>14K-16K</td>
<td>.0010</td>
<td>.0030</td>
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</table>
Astro Division, Laconia, NH

Astro designs and manufactures highly specialized custom bearings, next-up assemblies, and machined parts requiring significant engineering expertise and specialty materials. Our stringent process controls and advanced planning system enable us to satisfy unique production requirements and provide improved delivery scheduling as part of our continuous improvement culture and commitment to customer satisfaction.

PRODUCTS
- Rod ends
- Sphericals
- Link assemblies
- Bushings
- Loader slot bearings
- Custom-lined parts
- Bearings up to 22" O.D.
- Next-up assemblies & machined parts

NMB, KARUIZAWA, JAPAN *
- Rod ends
- Sphericals
- Spherical roller bearings
- Self-aligning roller bearings
- Next-up assemblies & machined parts

QUALITY CERTIFICATIONS
- ISO 9001:2008
- AS9100, Rev C
- Boeing D6-82479
- FAA FAR 21.303

NADCAP
- AC7102 – Heat-treating
- AC7108 – Chemical processing
- AC7114 – Nondestructive testing
- AC7118 – Composites/bonding

ENVIRONMENTAL MANAGEMENT CERTIFICATION
- ISO 14001:2004

* Astro is the North American sales representative for products manufactured by NMB’s facility in Karuizawa, Japan, giving customers access to a global supply of high quality commercial aerospace parts.
SIZE
-3 thru -5A  \( \frac{0.010}{0.005} \) R
-6 thru -24  \( \frac{0.017}{0.010} \) R

\[ \frac{0.015}{0.005} \times 45^\circ \text{ CHAMFER} \ (\text{TYP.}) \]