Rolling Bearings and Precision Machine Components for Food and Beverage Processing Machinery

Through advanced material engineering, lubrication technologies, and precision technologies, NSK products significantly improve the performance of food processing machinery.
NSK meets the requirements of food and beverage processing equipment

NSK’s bearings and precision machine components are used in a variety of machines, such as home electrical appliances, automobiles, semiconductor equipment, and aerospace industry applications.

Through our steadfast technical skill in meeting requests from global industries down to the last minute detail and our R&D and support systems that cater to needs in any country, NSK is developing operations worldwide as a top manufacturer. With our internationally recognized brand, we drive global industries with high quality and technological capability.

NSK’s Global Operations
Needs in Food Processing Lines

Raw Material Process

Required features:
- Dust proofing, water resistance, easy maintenance

Recommended products:
- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Steel Oil bushings
- Waterproof and Dustproof Bearing

Packaging Process

Low dust emissions, easy maintenance, high speed

Recommended products:
- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Clean Grease (GL2, LGU)
- Stainless-steel linear guides
- Stainless-steel ball screws
- Waterproof Megatorque Motor™

Primary Process (cutting, mixing)

Required features:
- Dust proofing, water resistance, easy maintenance

Recommended products:
- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Steel Oil bushings
- Waterproof Megatorque Motor™

Secondary Process (molding)

Required features:
- Dust proofing, water resistance, low dust emission, easy maintenance

Recommended products:
- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Clean Grease (LG2, LGU)
- Stainless-steel linear guides
- Stainless-steel ball screws
- Waterproof Megatorque Motor™

Conveyance Process

Required features:
- Low dust emissions, water resistance, easy maintenance

Recommended products:
- Stainless-steel bearings
- Monocarrier™
- Linear guides - Ball screws
- Stainless-steel linear guides
- Stainless-steel ball screws

Inspection Process

Water resistance, easy maintenance, high accuracy

Recommended products:
- Stainless-steel bearings
- Stainless-steel linear guides
- Stainless-steel ball screws
- KPM grease
- Monocarrier™
- Megatorque Motor™

Heating Process

Heat resistance, water resistance, easy maintenance

Recommended products:
- KPM grease
- Stainless-steel bearings

Heating Process
Needs in Beverage Processing Lines

Filling and Sealing Processes

- **Dust proofing, waterproof, low dust emission, easy maintenance**
- **Recommended products**
  - Molded-Oil™ bearings
  - NSK K1™ for food machinery
  - Stainless-steel bearings
  - Clean Grease (LG2, LGU)
  - Stainless-steel linear guides
  - Waterproof Megatorque Motor

Bottle Molding Process

- **Required features**
  - Dust proofing, water resistance, low dust emission, easy maintenance
- **Recommended products**
  - Molded-Oil™ bearings
  - NSK K1™ for food machinery
  - Stainless-steel bearings
  - Clean Grease (LG2, LGU)
  - Aqua-Bearing™
  - Stainless-steel linear guides
  - Waterproof Megatorque Motor

Filling process

- **Filling machine**
  - Fills bottle with beverage
  - Cap feeder
  - Cap alignment apparatus
  - Cap sterilizer

Blow molding process

- **Preform feeder**
- **Blow molding machine**
- **Depalletizer**
- **Bottle mouth ultraviolet pasteurizer**
- **Bottom ultraviolet pasteurizer**
- **Empty bottle inspection device**

Inpection Process

- **Waterproof, high speed, easy maintenance**
- **Recommended products**
  - Molded-Oil™ bearings
  - NSK K1™ for food machinery
  - Stainless-steel bearings
  - Stainless-steel linear guides
  - Stainless-steel ball screws
  - Linear guides - Ball screws
  - Monocarrier™
  - Waterproof Megatorque Motor
  - Megatorque Motor™

Printing inspection

- **Jet printer**
- **Bottle inspection device**
- **Steam tunnel**

Caser

- **PC coder**
- **Weight checker**
- **Palletizer**

Packaging process

- **Carton feeder**
- **Stacks products on pallets**
Product Introduction

**Stainless Steel Bearings (ES1 Stainless Steel Material)**

- Corrosion resistance: Better than SUS440C
- Hardness: Equivalent to SUS440C
- Noise level, operating life: Better than SUS440C

The corrosion resistance of ES1 is better than SUS440C.

Test bearing: 51305
Rolling elements: Ceramics
Rotational speed: 1,000 min⁻¹
Load: 980 N

**Corrosion resistance**

<table>
<thead>
<tr>
<th>Stress repetitions (cycles)</th>
<th>Corrosive medium resistance/SUS440C</th>
<th>Corrosive medium resistance/ES1</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>10⁵</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>10⁶</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>10⁸</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>10⁹</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>10¹⁰</td>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>

Saltwater spray test (JISZ2371)
Test solution: 3%NaCl aqueous solution
Test time: 1 hour
Test temperature: 35 ℃

**Aqua-Bearing™**

- Corrosion resistance: Five times more resistant than conventional resin bearings in strong acid environments.
- Durability: 1,000 times more durable than stainless steel bearings on the market.
- Maintainability: Self-lubricating fluororesin is used.

**Highly Corrosion-Resistant Coated Bearings**

- Corrosion resistance: Corrosion-resistant against sterilizing liquid, such as sodium hypochlorite solution and oxonia
- Durability: Longer life than SUS440C bearing
- Maintainability: Solid fluoric lubricant is used.

**Molded-Oil™ Bearings for Food Machinery**

**NSK K1™ Lubrication Unit for Food Machinery**

- Environmental friendliness: Lubricant is gradually supplied from porous synthetic resin, lowering grease splatter.
- Water resistance: Contact of lubricant with the roller surface ensures a constant supply of lubricating oil.
- Safety: In NSF-certified H1 lubricant is used.

**Durability in wet condition**

Molded-Oil bearings have an operating life twice that of grease-lubricated bearings.

- Test bearing: 6000
  - Rotational speed: 1,000 min⁻¹
  - Water spraying amount: 0.8 cm³/min
  -Radial load: 79.4 N
  - Axial load: 29.4 N

**Durability in water-immersed condition**

Molded-Oil bearings have an operating life twice that of grease-lubricated bearings.

- Test bearing: 6000
  - Rotational speed: 1,000 min⁻¹
  - Radial load: 79.4 N
  - Axial load: 29.4 N

**Environmental friendliness:**

Lubricant is supplied from the porous synthetic resin, lowering grease splatter.

**Water resistance:**

Contact of lubricant with the roller surface ensures a constant supply of lubricating oil.

**Safety:**

In NSF-certified H1 lubricant is used.
Product Introduction

Clean Grease (LG2, LGU)
- Lower particle emissions: Lower than commercially available fluorine greases
- Life: Over ten times longer than commercially available fluorine greases

Durability in atmospheric pressure
LG2 and LGU greases feature longer life than other grease at atmospheric pressure.
- Test bearing: 9305
- Rotational speed: 1,000 min⁻¹
- Relative rotation: Reverse rotation
- Ambient temperature: Room temperature
- Life

Heat-Resistant Grease (KPM)
- Heat resistance: Can be used up to 230 °C
- Life: Approximately five times longer than commercially available fluorine greases

Durability
KPM's operating life is approximately five times longer than commercially available fluorine greases.
- Test bearing: 6305
- Rotational speed: 10,000 min⁻¹
- Ambient load: 1,000 N
- Temperature of outer ring: 200 °C
- All atmospheric conditions

Table of Greases

<table>
<thead>
<tr>
<th>Name</th>
<th>Operating temperature range, °C</th>
<th>Feature</th>
<th>Base oil (Kinematic viscosity at 100°C, mm²/s)</th>
<th>Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLS</td>
<td>0~120</td>
<td>For food-processing machinery (NSF category H1)</td>
<td>150</td>
<td>280</td>
</tr>
<tr>
<td>BL2</td>
<td>0~200</td>
<td>For food-processing machinery (NSF category H1)</td>
<td>415</td>
<td>280</td>
</tr>
<tr>
<td>NS Hi-Lube</td>
<td>-40~130</td>
<td>Wide-range grease</td>
<td>25</td>
<td>250</td>
</tr>
<tr>
<td>LG2</td>
<td>-20~70</td>
<td>Clean grease</td>
<td>32</td>
<td>199</td>
</tr>
<tr>
<td>LGU</td>
<td>-40~120</td>
<td>Wide-range clean grease</td>
<td>95</td>
<td>201</td>
</tr>
<tr>
<td>KPM</td>
<td>-20~230</td>
<td>Grease for high-temperature use</td>
<td>420</td>
<td>280</td>
</tr>
</tbody>
</table>

Greases for Food Processing Machinery
- RLS grease is usable at temperatures up to 120°C while BL2 grease is usable up to 200°C.
- Both RLS and BL2 grease meet Halal and Kosher dietary laws.
- Properties of grease

<table>
<thead>
<tr>
<th>Name</th>
<th>RLS</th>
<th>LS2 for high-temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Category</td>
<td>H1</td>
<td>H1</td>
</tr>
<tr>
<td>Base oil</td>
<td>Synthetic hydrocarbon oil</td>
<td>Fluorine oil</td>
</tr>
<tr>
<td>Thickener</td>
<td>Aluminum alloy soap</td>
<td>PTFE</td>
</tr>
<tr>
<td>Kinematic viscosity (mm²/s at 100°C)</td>
<td>150</td>
<td>415</td>
</tr>
<tr>
<td>Consistency</td>
<td>280</td>
<td>280</td>
</tr>
<tr>
<td>Water wash-out</td>
<td>7.9%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0~120°C</td>
<td>0~200°C</td>
</tr>
</tbody>
</table>

NSK HPS High-Performance Standard Deep Groove Ball Bearings for Industrial Machinery

Features
- Compared with conventional products...
- Higher life 15% increase
- Lower internal stress 15% increase
- Wide series lineup

- Shielded ZZ
- Non-contact coated VV
- Contact coated CU
Product Introduction

Linear Guides (Stainless Steel)
- Corrosion resistance: Available with fluoride low-temperature chrome plating.
- Durability: Long operating life equivalent to general steel.
- Maintainability: Available with K1 lubrication unit for food processing machinery.
- Lineup: NH Series models NH15 to NH30 and all PE, PU, and NS Series linear guides are available.

Monocarrier™ (MCM and MCH Series)
- Corrosion resistance: Fluoride low-temperature chrome plating is standard (rails, roller slides).
- Maintainability: NSK K1 lubrication unit is standard. The K1 unit for food processing machinery is also available.
- Lineup: 10 models are available, with rail widths ranging from 28 mm to 100 mm.

Standard Ball Screws (PSS and FSS Series)
- Corrosion resistance: Available with fluoride low-temperature chrome plating.
- Lineup: Products with diameters of 6-25 mm and leads of 2-60 mm are available.

Megatorque Motor™ (PS and PN Series)
- Low dust emission without reguring decelerator.
- Maintainability: Maintenance-free
- Lineup: Outer rotor motors and inner rotor motors are available. Maximum output torque: 6 N·m – 180 N·m

Environment-Resistant Megatorque Motor (Z Series)
- Environment resistance: World’s first IP66 rating under IEC standards
- Durability: Withstands high-pressure water jets
- Maintainability: Maintenance-free

Rotor
- Withstands high loads
  Axial load: 9,500 N
  Moment load: 200 N·m
- Mechanism to mitigate pressure from water jets is introduced to meet IP66 rating (with rotor in motion).
  Rigidly and accuracy of rotor are improved for enhanced sealing. (Axial and radial runout of output shaft: 10 μm)

Motor securing face
- Connector terminal (Bottom routing is also possible)
- AN air purge hole is provided to enhance reliability.
- Since the bottom face is waterproof and dustproof, with O-ring surface treatment is not necessary.
- The outer and inner diameters are designed with centering easy.
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