**Catalog Number of KHK Stock Gears**

The Catalog Number for KHK stock gears is based on the simple formula listed below. Please order KHK gears by specifying the Catalog Numbers.

**Example** Bevel Gears

![Bevel Gears Diagram](Image)

```
| M  | BS | G  | 2-40  | 20  | R |
```

**Direction of Helix (Right)**

- **S**: Straight Bevel Gears
- **BS**: Spiral Bevel Gears
- **H/P**: High-Ratio Hybrid Gears

**No. of Teeth of mating gears (20)**

- **S45C**: Steel
- **SCM15**: Steel
- **Stainless Steel**: Stainless Steel
- **MC901**: Copper
- **Polyoxyn**: Polyoxyn

**No. of Teeth (40)**

- **Ground Gears**

**Module (2)**

**Type (Spiral Bevel Gears)**

**Material (SCM415)**

**Other Information**

- **G**: Ground Gears

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**Features**

KHK stock bevel gears are available in two types, spiral bevel gears and straight bevel gears, in gear ratios of 1.5 through 5, and are offered in a large variety of modules, numbers of teeth, materials and styles. The following table lists the main features for easy selection.

<table>
<thead>
<tr>
<th>Type</th>
<th>Catalog Number</th>
<th>Module</th>
<th>Gear Ratio</th>
<th>Material</th>
<th>Heat treatment</th>
<th>Tooth Surface Treatment</th>
<th>Precision Diametrical</th>
<th>Tolerance</th>
<th>Pitch Dia.</th>
<th>Teeth</th>
<th>Secondary Operations</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHP</td>
<td>1, 1.5</td>
<td>15-60</td>
<td>SCM415</td>
<td>Ground</td>
<td>Carburized</td>
<td>Hlim</td>
<td>K</td>
<td>3</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>Gears that have been tempered, hardened and ground that are capable of rapid characterization</td>
</tr>
<tr>
<td>MBSG</td>
<td>2-4</td>
<td>2</td>
<td>SCM415</td>
<td>Ground</td>
<td>Carburized</td>
<td>Klim</td>
<td>C</td>
<td>1</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>Gears that have been hardened and ground that have excellent accuracy, strength and abrasion resistance. Secondary operations are possible after the hardening and grinding process.</td>
</tr>
<tr>
<td>SBSG</td>
<td>2-4</td>
<td>1.5-3</td>
<td>846C</td>
<td>Ground</td>
<td>Gear teeth</td>
<td>Hlim</td>
<td>K</td>
<td>2</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>Gears that have been hardened and ground and have a better accuracy, wear resistance and cost. Secondary operations are possible after the hardening and grinding process.</td>
</tr>
<tr>
<td>KSP</td>
<td>1.5-6</td>
<td>1-2</td>
<td>SCM415</td>
<td>Ground</td>
<td>Ground</td>
<td>Hlim</td>
<td>C</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>Gears that have been hardened and ground that have good accuracy, strength, abrasion resistance and cost. Secondary operations can be performed after the hardening and grinding process.</td>
</tr>
<tr>
<td>MBSA/MBSB</td>
<td>2-6</td>
<td>1.5-3</td>
<td>SCM415</td>
<td>Ground</td>
<td>Carburized</td>
<td>Hlim</td>
<td>C</td>
<td>4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Gears that have been fully hardened and have excellent strength and wear resistance. Can be used in the finished shape.</td>
</tr>
<tr>
<td>SBS</td>
<td>1-5</td>
<td>1.5-4</td>
<td>846C</td>
<td>Carburized</td>
<td>Carburized</td>
<td>Klim</td>
<td>C</td>
<td>4</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>Gears that have been hardened with excellent wear resistance. Secondary operations are possible after the hardening and grinding process.</td>
</tr>
<tr>
<td>SB/SBY</td>
<td>1-8</td>
<td>1.5-6</td>
<td>846C</td>
<td>--</td>
<td>Carburized</td>
<td>Hlim</td>
<td>C</td>
<td>3</td>
<td>O</td>
<td>X</td>
<td>X</td>
<td>Many line-ups are available at a low price. The teeth can be additionally hardened.</td>
</tr>
<tr>
<td>SUB</td>
<td>1.5-3</td>
<td>1.5-3</td>
<td>SUS303</td>
<td>Carburized</td>
<td>Carburized</td>
<td>Klim</td>
<td>C</td>
<td>3</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>Stainless steels with rust resistance.</td>
</tr>
<tr>
<td>PB</td>
<td>1-3</td>
<td>1.5-3</td>
<td>MC901</td>
<td>Carburized</td>
<td>Carburized</td>
<td>Klim</td>
<td>C</td>
<td>4</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>Nylon gears can be used with no lubrication.</td>
</tr>
<tr>
<td>DB</td>
<td>0.5-1</td>
<td>2</td>
<td>DurasonF</td>
<td>--</td>
<td>Hardened</td>
<td>Hlim</td>
<td>C</td>
<td>6</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>Low-priced gears made through injection molding. Suitable for light loads.</td>
</tr>
</tbody>
</table>

**NOTE 1:** Although these are carburized products, secondary operations can be performed as the basic configuration and the hub portions are machined during the carburization.

**NOTE 2:** The hardness of the hub is determined by the manufacturer, and the hardness (HRC) at maximum occurs in some cases.

**Application Examples**

KHK stock bevel gears are used as gears for power transmission of intersecting axes in various devices.

- **Differential Gear Mechanism Example**
- **SHESCO 2WD Bike**

![Image](image1)

Image provided by: PK Design

SB Bevel Gears are used in the driving components in both the front and rear wheels.

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**KHK Technical Information**

**Selection Hints**

Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables. It is also important to read all applicable "CAUTION" notes shown below before the final selection.

1. **Caution in Selecting the Mating Gears**

   Basically, KHK stock bevel gears should be selected as shown in the catalog in pairs (e.g., MBSG2-0200L should mate with MBS62-0200L). But, for straight tooth bevel gears, there is some interchangeability with different series. For plastic bevel gears, we recommend metal mating gears for good heat conductivity.

   ![Image](image2)

   Right (R)  
   Left (L)

2. **Caution in Selecting Gears Based on Gear Strength**

   The gear strength values shown in the product pages were computed by assuming the application environment in the table. Therefore, they should be used as reference only. We recommend that each user computes their own values by applying the actual usage conditions. To learn more about strength calculations, please refer to the technical information contained in the “Bending Strength of Bevel Gears” section, and the “Surface Durability of Bevel Gears” section.

   ![Image](image3)

   **Calculation of Bending Strength of Gears**

<table>
<thead>
<tr>
<th>Item</th>
<th>Catalog Number</th>
<th>MBSG MBSA MBSB</th>
<th>SB/SBS</th>
<th>SB/SBS</th>
<th>SUB</th>
<th>PB</th>
<th>DB</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of teeth of mating gear</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rotational Speed of Pinion</td>
<td>100rpm (1000rpm for MBSG and SB/SBS)</td>
<td>100rpm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Design Life (Duration)</td>
<td>Over 10 cycles</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Impact from motor</td>
<td>Uniform load</td>
<td>Uniform load</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Impact from load</td>
<td>Uniform load</td>
<td>Uniform load</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Direction of load</td>
<td>Directional load (calculated with allowable bending stress of 2/3)</td>
<td>1.5 (90°C with HRC 45)</td>
<td>1.5 (90°C with HRC 45)</td>
<td>1.5 (90°C with HRC 45)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Allowable bending stress (2/3)</td>
<td>47</td>
<td>21</td>
<td>19 (24-25)</td>
<td>10.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Safety factor Kc</td>
<td>1.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Formula:**

\[ Kc = \frac{1}{2} \left( \frac{\sigma_{lm}}{\sigma_{sa}} \right) \]

**NOTE 1:** The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications. "MRC Nylon Technical Data" by Mitsubishi Chemical Advanced Materials and "Durason (F) Gear" by Polyplastics Co. The values for the rotational speed (rpm) and the stress (kgf/cm²) are adjusted to the units needed in the form.

**NOTE 2:** Since SB Bevel Pinion Shafts are thermally refined, the allowable tooth-root bending stress and allowable helix stress for the values shown in parentheses.

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**Application Hints**

In order to use KHK stock bevel gears safely, carefully read the Application Hints before proceeding.

If there are questions or you require clarifications, please contact our technical department or your nearest distributor.

E-mail: info@khkgears.net

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1. **Cautions on Handling**
   - KHG products are packaged one by one to prevent scratches and dents, but if you find issues such as rust, scratches, or dents when the product is removed from the box after purchase, please contact the supplier.
   - According to the handling method, the product may become deformed or damaged. Plastic gears and ring gears deform particularly easily, so please handle with care.

2. **Caution on Performing Secondary Operations**
   - If reworking, it is important to pay special attention to locating the center in order to avoid runout.
   - The reference datum for gear machining is the bore. Therefore, use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
   - If reworking using scroll chucks, we recommend the use of new or reworked jaws for improved precision. Please exercise caution not to crush the teeth.

3. **Points of Caution during Assembly**
   - Since bevel gears are cone shaped, they produce axial thrust forces. Especially for spiral bevel gears, the directions of thrust change with the hand of spiral and the direction of rotation. This is illustrated below. The bearings must be selected properly to be able to handle these thrust forces. For details, please refer to our separate technical reference book, section of "Gear Forces".

   **Direction of Rotation and Thrust Force**
   - **Direction of Rotation**
     - **Thrust Force**

   **Lathe Operations**

   - For tapping and keyway operations, see the examples given in "Caution on Performing Secondary Operations" in KHG Stock Spur Gear section. When cutting keyways, avoid stress concentration, always round the corners.
   - PB plastic bevel gears are susceptible to changes due to temperature and humidity. Dimensions may change between, during, and after re-machining operations.

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**Bevel Gears**

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**KHK Technical Information**

1. **When installing MBGA or MBBS spiral bevel gears produced in B7 style (ring gear), always secure the gears onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.**

   ![Correct Tooth Contact](image1)

   - When assembled correctly, the contact will occur on both gears. In the middle of the face and center of face width but somewhat closer to the inner face.

   **Incorrect Tooth Contact**
   - When the pitch or center of contact are too high or too low, the gear will not contact at the face or back.

---

2. **Cautions on Starting**

   1. Check the following items before starting.
      - Are the gears fastened securely?
      - Is there uneven tooth contact?
      - Is there adequate backlash?

   2. Be sure to adjust the backlash.

   3. **Hydraulic lubrication has been supplied**

   4. If gears are exposed, be sure to attach a safety cover to ensure safety. Also, be careful not to touch rotating gears.

   5. For more technical information on lubricating gears, please see the section "Gear Lubrication" in our separate technical reference book.

   6. If there is any abnormality such as noise or vibration during startup, stop the operation immediately and check the assembly condition such as tooth contact, eccentricity, and looseness. For more technical information, please see the section "Gear Noise and Countermeasures" in our separate technical reference book.

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