### GUIDE POSTS & BUSHINGS FOR DIE SETS

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Catalog No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROLLER GUIDE POST SETS FOR DIE SETS</td>
<td>RGBL, RGSL, RGKL, RBJ, RSTM, RSTK, RSWP, RWR</td>
</tr>
<tr>
<td>BALL GUIDE POST SETS FOR HIGH-RIGIDITY DIE SETS</td>
<td>QBSH, QBHS, QMSH, QKSH, QB, QM, QK</td>
</tr>
<tr>
<td>BALL GUIDE POST SETS FOR DIE SETS</td>
<td>PBSH, GBSH, PMSH, GMSH, PKSH, GKS, PK</td>
</tr>
<tr>
<td>GUIDE POSTS &amp; BUSHINGS FOR DIE SETS</td>
<td>PD, PF, PZ, PFZ, MP, BP, MP, PM, GM, MP, BM, LP, LP</td>
</tr>
<tr>
<td>BALL GUIDE POST SETS FOR DIE SETS</td>
<td>MRP, BRPM, BPRM, MSP, BSPM, BSPK, MBB, LBB, LBB, RBB, LBBS</td>
</tr>
<tr>
<td>SPRINGS BALL CAGES FOR DIE SETS</td>
<td>SWPB, MBSH, MBS, MBJ, STM, STK, SWP, SWPL</td>
</tr>
<tr>
<td>DIE ADHESIVES</td>
<td>MSR, MSR, MSKS, MSKTP, LOC638</td>
</tr>
<tr>
<td>SHAFTS FOR PREVENTING CAGE LIFTING</td>
<td>RB, LB, LB, LFB, LFBZ</td>
</tr>
<tr>
<td>プランガイドポストセット・ハイリギッドディエセット用ボルト・プレスインセットの種類</td>
<td>PD, PF, PZ, PFZ, MP, BP, MP, PM, GM, MP, BM, LP, LP</td>
</tr>
<tr>
<td>プランガイドボルトセット・ディエセット用の種類</td>
<td>PBSH, GBSH, PMSH, GMSH, PKSH, GKS, PK</td>
</tr>
</tbody>
</table>

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**Note:** The table above lists various components and their corresponding catalog numbers for guide posts and bushings used in die sets. Each row details a specific product type and its associated catalog numbers, providing a comprehensive overview of the components available for die set applications.
GUIDE POST SETS FOR DIE SETS

Comparison of roller guides, high-rigidity ball guides, ball guides, and plain guides

<table>
<thead>
<tr>
<th>Type</th>
<th>Item</th>
<th>Seizure resistance</th>
<th>Rigidity</th>
<th>Cost ratio</th>
<th>Max. allowable speed</th>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller guide</td>
<td>A</td>
<td>B</td>
<td>8.1</td>
<td>A</td>
<td>A</td>
<td>—</td>
</tr>
<tr>
<td>High-rigidity ball guide</td>
<td>C</td>
<td>D</td>
<td>1.5</td>
<td>B</td>
<td>C</td>
<td>—</td>
</tr>
<tr>
<td>Ball guide</td>
<td>A</td>
<td>D</td>
<td>1.0</td>
<td>B</td>
<td>E</td>
<td>—</td>
</tr>
<tr>
<td>Plain guide</td>
<td>D</td>
<td>A</td>
<td>1.0</td>
<td>D</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Effect of the guide type on die set rigidity

Deflection of a die set increases in the following order: Plain < Roller < High-rigidity ball < Ball.

Figure 2: Effect of guide type on die set rigidity

Comparison of ball cages

<table>
<thead>
<tr>
<th>Item</th>
<th>Aluminum cage (RB5. RBSH)</th>
<th>Resin cage (RB5. RBSH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main use</td>
<td>Sturdy aluminum ball cages are often used for die applications in which guide posts and bushings are removed and inserted during pressforming, or in which the workpiece is bent.</td>
<td>Resin cages are often used for precision dies and dies used at high speed.</td>
</tr>
<tr>
<td>Ball holding force</td>
<td>Large because aluminum is used. Weaker than aluminum.</td>
<td></td>
</tr>
<tr>
<td>Length of ball cage</td>
<td>Interchangeable but deforms when dropped.</td>
<td>May break when dropped.</td>
</tr>
<tr>
<td>Weight</td>
<td>Heavier than resin.</td>
<td>Can be used for high SPI bars to light weight.</td>
</tr>
<tr>
<td>Wear particles</td>
<td>Aluminum wear particles are produced.</td>
<td>Wear particles are unlikely.</td>
</tr>
</tbody>
</table>

Features of various stopper systems

- No stopper
  - Not suitable for dies which require that posts and bushings be removed and inserted.
  - Difficult to adjust the ball cage height when assembling.
  - Because no stopper is present, can be used even for low shut-height dies.

- Movable stopper (RSTM-STM)
  - Ball cage height can be adjusted easily during assembly.
  - Because the movable stopper lowers as the press lowers, can be used even for low shut-height dies.

- Fixed stopper (RSTK-STK)
  - The high stopper strength makes this type ideal for dies which require that posts and bushings be removed and inserted.
  - Ball cage height can be adjusted easily during assembly.
  - Because the stopper is fixed, this type is not suitable for low shut-height dies.

Guideline for selecting spring length (FL)

Detachable type: Press-fit type

- FL = L - [(T - (RorU) + R/2)]
- FL = mL - [(T - (RorU) + R/2)]

Where: L: Post length; T: Flange thickness; R: Die holder thickness; mL: U: U of post; R: R of post; RL: Cage length

Machining the mounting holes for guide post and bushing

- Guide post and bushing mounting holes should be machined by boring or grinding after the machining of all other holes is completed and after any machining deformation has been removed (by example: by regirling the top and bottom surfaces).
- One method of creating a position reference for upper and lower dies is to create a dummy hole and insert a pin.

Installing guide posts

- After cleaning the mounting hole, fix the guide post in place using a bolt.
- In the case of a roller guide post set, offsetting the reference plane of one guide post by 90° from the other posts helps prevent errors when the die set is assembled.
- Check the post perpendicularity (0.1mm/100mm or less).
- When press-fitting the post, use a hydraulic press or similar means and insert the post slowly. Tapping the post with a hammer may cause post bending or deformation.

Installing guide bushings

- Place the bushing onto the guide post.
  (For a roller guide, align the matchmark and symbol.)
- Place a parallel block on the die holder and place the punch holder on it.
- Slide the guide bushing to check for any interference.
- Use solvent to clean any oil or dirt from the contact surface, then apply an anaerobic adhesive agent (Loctite 638) or a similar agent. Insert the adhesive agent into the guide bushing’s adhesive groove, and insert the bushing into the mounting hole. Set the guide bushing so that it will not come out from the punch holder and allow the adhesive to harden under those conditions (3 to 6 hours at normal temperatures).

Installing stoppers

- Movable stopper—After the adhesive agent has completely hardened, insert the spring and cage, and tighten the hexagon shaft of the movable stopper RSTM-STM using a spanner.
- Fixed stopper—After the adhesive agent has completely hardened, insert the spring and cage, and attach the fixed stopper RSTK-STK.

Removing and installing guide posts

Removing

- Remove the movable stopper, ball cage and spring from the guide post.
- Loosen the bolt and remove the retaining washer.
- In order to avoid damaging the internal surfaces of the mounting hole or tap holes, position a cushion block (such as a copper alloy block) and tap the block with a hammer to remove guide post.

Installing

- Place the guide post set on the die set, align the guide bushing matchmark with the punch holder.
- Place the bushing onto the guide post.
- Slide the guide bushing to check for any interference.
- After cleaning and inserting the guide bushing, set the guide bushing so that it will not come out from the punch holder and allow the adhesive to harden under those conditions (3 to 6 hours at normal temperatures).

Installing guide bushing

Aligning the post and bushing

Machining of mounting hole

Installing guide post

Installing guide post

Aligning the post and bushing

Machining of mounting hole

Installing guide post

Aligning the post and bushing

Machining of mounting hole
Comparison of roller guides, high-rigidity ball guides, ball guides, and plain guides

<table>
<thead>
<tr>
<th>Type</th>
<th>Item</th>
<th>Seizure resistance</th>
<th>Rigidity</th>
<th>Cost ratio</th>
<th>OIL type</th>
<th>Max. allowable speed</th>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller guide</td>
<td>A</td>
<td>B</td>
<td>8.1</td>
<td>A</td>
<td>Oil</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>High-rigidity ball guide</td>
<td>C</td>
<td>1.9</td>
<td>A</td>
<td>—</td>
<td>Oil-free type</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Ball guide</td>
<td>A</td>
<td>D</td>
<td>1.6</td>
<td>B</td>
<td>Oil-free type</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Plain guide</td>
<td>Copper alloy − MoS₂</td>
<td>A</td>
<td>1.3</td>
<td>B</td>
<td>Oil-free type</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>SU2 &lt; MoS₂</td>
<td>B</td>
<td>1.4</td>
<td>C</td>
<td>Oil-free type</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Plain guide</td>
<td>D</td>
<td>1.0</td>
<td>D</td>
<td>Oil-free type</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Cost ratio with 1 as the price of a detachable plain guide R032-160.

Effect of the guide type on die set rigidity

Deflection of the die set increases in the following order: Plain < Roller < High-rigidity ball < Ball.

Comparison of ball cages

<table>
<thead>
<tr>
<th>Item</th>
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<th>Resin cage [MBJ, MBJSN]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main uses</td>
<td>Studied aluminum ball cages are often used for die applications in which the guide posts and bushings are removed and inserted during pressing, or in which the workpiece is bent.</td>
<td>Resin cages are often used for precision dies and dies used at high speed.</td>
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</tr>
<tr>
<td>Length &amp; ball gap</td>
<td>Interchangeable but deforms when dropped. May break when dropped.</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Heavier than resin. Can be used for high SME due to its weight.</td>
<td></td>
</tr>
<tr>
<td>Wear particles</td>
<td>Aluminum wear particles are produced. Wear particles are unlikely.</td>
<td></td>
</tr>
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Features of various stopper systems

- **No stopper**
  - Not suitable for dies which require that posts and bushings be removed and inserted.
  - Difficult to adjust the ball cage height when assembling.
  - Because no stopper is present, can be used even for low shut-height dies.

- **Movable stopper (RSTM-STM)**
  - Ball cage height can be adjusted easily during assembly.
  - Because the movable stopper lowers as the press lowers, can be used even for low shut-height dies.

- **Fixed stopper (RSTK-STK)**
  - The high stopper strength makes this type ideal for dies which require that posts and bushings be removed and inserted.
  - Ball cage height can be adjusted easily during assembly.
  - Because the stopper is fixed, this type is not suitable for low shut-height dies.

Guideline for selecting spring length (FL)

- **Detachable type**
  - FL = L + (Rₖ + Dₖ + RL) / 2

- **Press-fit type**
  - FL = L + (Rₖ + Dₖ + RL) / 2

Where: L = Post length
  - T = Flange thickness
  - U = Die holder thickness
  - Rₖ = R of post
  - Rₖ = R of post
  - RL = Cage length

Installing a guide post set

- **Machining the mounting holes for guide post and bushing**
  - Guide post and bushing mounting holes should be machined by boring or (if) grinding after the machining of all other holes is completed and after any machining deformation removed (by example by reginning the top and bottom surfaces).
  - One method of creating a position reference for upper and lower dies is to create a dummy hole and insert a pin.

- **Installing guide posts**
  - After cleaning the mounting hole, fix the guide post in place using a bolt.
  - In the case of a roller guide post set, setting the reference plane of one guide post by 90° from the other posts helps prevent errors when the die is assembled.
  - Check the post perpendicularly (0.1mm/100mm or less).
  - When press-fitting the post, use a hydraulic press or similar means and insert the post slowly. Tapping the post with a hammer may cause post bending or deformation.

- **Installing guide bushings**
  - Place the bushing onto the guide post.
    - (For a roller guide, align the matchmark and symbol.)
  - Place a parallel block on the die holder and place the punch holder on it.
  - Slide the guide bushing to check for any interference.
  - Use solvent to clean any oil or dirt from the contact surface, then apply an anorganic adhesive agent (Loctite 638) to the guide bushing’s adhesive groove, and insert the bushing into the mounting hole.
  - Set the guide bushing so that it will not come out from the punch holder and allow the adhesive to harden under those conditions. (3 to 6 hours at normal temperatures)

- **Installing stoppers**
  - **Movable stopper** — After the adhesive has completely hardened, insert the spring and cage, and tighten the hexagon shaft of movable stopper RSTM-STM using a spanner.
  - **Fixed stopper** — After the adhesive has completely hardened, insert the spring and cage, and attach the fixed stopper RSTK-STK.

Removing and installing guide posts

- **Removing**
  - Remove the movable stopper, ball cage and spring from the guide post.
  - Loosen the bolt and remove the retaining washer.
  - In order to avoid damaging the internal surfaces of the mounting hole or tap holes, position a cushion block (such as a copper alloy block) and tap the block with a hammer to remove the guide post.

- **Installing**
  - Attach the spring, cage and movable stopper to the guide post, then insert the guide post into the guide bushing.
  - Place a parallel block onto the punch holder and position the die holder on top so that the die holder does not contact the roller guide or ball guide.
  - Slide each guide post up and down to check for any interference with the mounting hole. If necessary, adjust the punch holder position.
  - After cleaning the mounting hole, fix the guide post in place using a bolt.
ROLLER GUIDE POST SETS FOR DIE SETS

--- GUIDE ---

Features of roller guide

A roller guide has rollers positioned on 6 faces, producing a contact area that is several times larger than that of a ball guide, also provides rigidity that is nearly equivalent to a plain guide. This results in rigidity and accuracy that are not possible with ball guides. Roller guides not only improve the overall rigidity and straightness of the die set, they can also maintain smooth vertical strokes and stable accuracy over long periods of time. They also feature improved durability in response to high-speed intermittent operation and vibration.

Changing from point contact to linear contact [Achievement of high rigidity]

A roller’s contact surface area is approximately 10 times larger than that of a ball, and this results in a higher level of rigidity between the guide post and guide bushing when a roller guide is used.

The ball guide improves the rigidity by increasing the preload to 10 to 25 \( \mu \)m. However, the large preload causes a large thrust shock to the ball, resulting in vibration.

Because the contact is linear, the preload of the rollers is much smaller, at 4 to 12 \( \mu \)m. This contributes to smooth movement and reduced thrust shock.

Component names

1. Guide bushing
   Hardness: 60 ~ 62HRC
   Raceway surface: Ra0.2 \( \mu \)m

4. Matchmark/symbol
   When using the bushing, align the matchmarks on the bottom of the guide bushing and the side of the guide post flange, and be sure that the post and bushing symbols are matched.
   (Concentricity when properly aligned: 3 \( \mu \)m or less)

2. Roller cage
   Single-piece structure made of polyacetal

3. Guide post
   Hardness: 60 ~ 62HRC
   Raceway surface: Ra0.1 \( \mu \)m

5. Reference surface
   Offsetting the reference surface of one guide post by 90° from the other posts helps prevent errors when the die set is assembled.

Applications

- Precision punch dies for ultra thin metal and resin materials
  Switches, relay components, lead frames, printed circuits, films, etc.

- Punch dies for relatively thick materials
  Motor components, connectors, fine blanking, etc.

- Guides for specialized machines and precision machines
  For press units, positioning control, jigs, etc.

Accuracy standards for roller guides and die sets

<table>
<thead>
<tr>
<th>Inspection item</th>
<th>Measurement method</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface roughness of holder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference surface</td>
<td>Upper/lower surface</td>
<td>Other surfaces</td>
</tr>
<tr>
<td>Nominal size</td>
<td>100 or less</td>
<td>200 or less</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.004</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Perpendicularity of die holder bottom surface and guide post

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>100 or less</th>
<th>200 or less</th>
<th>300 or less</th>
<th>600 or less</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>0.008</td>
<td>0.012</td>
<td>0.02</td>
<td>0.025</td>
</tr>
</tbody>
</table>

- Select an appropriate guide post length so that the guide bushing will not separate from the guide post at top dead center during press processing.
- The minimum stroke of the roller guide must be equal to or larger than the roller diameter \( \phi \) \( \times \) \( \pi \).
  A stroke shorter than this will cause stress to be applied at certain rollers only; resulting in rapid deterioration of roller guide performance.
- Be sure to periodically lubricate the roller guide.
- If scraps or other debris collect in the roller guide, protect the guide using a cover.
- Do not modify the roller guide. (Doing so may make it impossible to achieve the designated accuracy and performance.)
ROLLER GUIDE POST SETS FOR DIE SETS

--- GUIDE ---

**Features of roller guide**

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**Changing from point contact to linear contact**

Achievement of high rigidity

A roller’s contact surface area is approximately 10 times larger than that of a ball, and this results in a higher level of rigidity between the guide post and guide bushing when a roller guide is used.

The ball guide improves the rigidity by increasing the preload to 10 to 25 µm. However, the large preload causes a large thrust shock to the ball, resulting in vibration.

Because the contact is linear, the preload of the rollers is much smaller, at 4 to 12 µm. This contributes to smooth movement and reduced thrust shock.

**Component names**

1. Guide bushing
   Hardness: 60 ~ 62HRC
   Raceway surface: Ra0.2 µm

2. Roller cage
   Single-piece structure made of polyacetal

3. Guide post
   Hardness: 60 ~ 62HRC
   Raceway surface: Ra0.1 µm

4. Matchmark/symbol
   When using the bushing, align the matchmarks on the bottom of the guide bushing and the side of the guide post flange, and be sure that the post and bushing symbols are matched.
   (Concentricity when properly aligned: 3 µm or less)

5. Reference surface
   Offsetting the reference surface of one guide post by 90° from the other posts helps prevent errors when the die set is assembled.

**Applications**

- Precision punch dies for ultra thin metal and resin materials
- Switches, relay components, lead frames, printed circuits, films, etc.
- Punch dies for relatively thick materials
- Motor components, connectors, fine blanking, etc.
- Guides for specialized machines and precision machines
- For press units, positioning control, jigs, etc.

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**Accuracy standards for roller guides and die sets**

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<tr>
<td>Surface roughness of holder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference surface</td>
<td>Upper/lower surfaces</td>
<td>Other surfaces</td>
</tr>
<tr>
<td>Nominal size (length of longer side)</td>
<td>100 or less</td>
<td>200 or less</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.004</td>
<td>0.008</td>
</tr>
</tbody>
</table>

| Parallelism of upper/lower surfaces for punch holders and die holders | | |
| Nominal size (length of longer side) | 100 or less | 200 or less | 300 or less | 600 or less |
| Accuracy | 0.004 | 0.008 | 0.01 | 0.015 |

| Perpendicularity of die holder bottom surface and guide post | | |
| Accuracy | 0.01/100 or less |

| Parallelism after assembly | | |
| Nominal size (length of longer side) | 100 or less | 200 or less | 300 or less | 600 or less |
| Accuracy | 0.008 | 0.012 | 0.02 | 0.025 |

**Notes**

- Select an appropriate guide post length so that the guide bushing will not separate from the guide post at top dead center during press processing.
- The minimum stroke of the roller guide must be equal to or larger than the roller diameter \( \phi \times \pi \).
  A stroke shorter than this will cause stress to be applied at certain rollers only; resulting in rapid deterioration of roller guide performance.
- Be sure to periodically lubricate the roller guide.
- If scraps or other debris collect in the roller guide, protect the guide using a cover.
- Do not modify the roller guide. (Doing so may make it impossible to achieve the designated accuracy and performance.)
Assemble the set in accordance with “Accuracy standards for roller guides and die sets” on page 782.
Assemble the set in accordance with “Accuracy standards for roller guides and die sets” on page 782.
### Roller Cages and Stoppers for Roller Guide Posts

**RBJ (Roller cage)**

- **Material**: SUJ2 (Polyacetal)
- **Type**: PD
- **Number of rollers**: 9 pieces
- **Diameter**:
  - 2.0: 16.0, 16.3, 16.8
  - 2.5: 20.3, 20.8, 21.3
  - 3.0: 25.4, 26.0, 26.5
- **Base unit price**:
  - 2.0: 13, 16, 19
  - 2.5: 20, 25, 30
  - 3.0: 30, 35, 40

**RSTK (Fixed stopper)**

- **Material**: Electroless nickel plating
- **Type**: PD
- **Diameter**:
  - 2.0: 20.0, 20.3, 20.6
  - 2.5: 25.4, 25.7, 26.0
  - 3.0: 30.0, 30.3, 30.6
- **Base unit price**:
  - 2.0: 11, 14, 17
  - 2.5: 16, 19, 22
  - 3.0: 21, 24, 27

### Springs for Roller Guide Posts / Rings for Preventing Cage Lifting

**RSWP (Spring)**

- **Material**: Polyacetal resin (POM), black
- **Type**: PD
- **Diameter**:
  - 2.0: 20.1 + 1.5, 25.2 + 2.0
  - 2.5: 27.6 + 2.5, 32.3 + 3.0
  - 3.0: 30.2 + 3.5, 35.0 + 4.0
  - 4.0: 38.5 + 5.0
- **Base unit price**:
  - 2.0: 20, 25, 30
  - 2.5: 25, 30, 35
  - 3.0: 30, 35, 40
  - 4.0: 40, 45, 50

**RWR (For roller guides)**

- **Material**: Polyacetal resin (POM), black
- **Diameter**:
  - 2.0: 20.1, 25.2, 30.2
  - 2.5: 27.6, 32.3, 37.0
  - 3.0: 30.2, 35.0, 40.0
  - 4.0: 40.5, 45.5
- **Base unit price**:
  - 2.0: 20, 25, 30
  - 2.5: 25, 30, 35
  - 3.0: 30, 35, 40
  - 4.0: 40, 45, 50
**Roller Cages and Stoppers for Roller Guide Posts**

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of rollers</th>
<th>Catalog No.</th>
<th>Base unit price</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD 1</td>
<td>9 pieces</td>
<td>RBJ</td>
<td>2.0</td>
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<td></td>
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<td></td>
<td>4.0</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.0</td>
</tr>
</tbody>
</table>

**RSTM (Movable Stopper)**

- **S45C, SPC**
- **Electroless nickel plating**

**RSTK (Fixed Stopper)**

- **S45C**
- **Electroless nickel plating**

**RWR (For Roller Guides)**

- **Polyacetal resin (POM)**

---

**Springs for Roller Guide Posts / Rings for Preventing Cage Lifting**

**RSWP (Spring)**

- **Fl (Free length)**

**RWR (For Roller Guides)**

**Features**

- **Polyacetal resin (POM), black**

---

For the spring length selection standards, refer to P. 779.
Installing the bushing

Devcon adhesive

MBB

LBB

Loctite adhesive

Loctite No. 638

---

**High-rigidity ball guide post sets**

- No stopper
- Movable stopper
- Fixed stopper

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**Ball guide post sets**

- No stopper
- Movable stopper
- Fixed stopper

![Diagram of ball guide post sets]

- RB (QBSH)
- RM (QK)
- RK (QR)
- RBSH (QBSH)
- RMMH (QSMH)
- RSKH (QKS)
- RXSH (QKS)

**Catalog No.**

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**MBB-LBB**

- 50
- 60
- 70
- 80
- 90
- 100
- 110
- 120

---

About high-rigidity ball guide post sets

These products utilize a high-rigidity ball cage (MBBSH, MBJS) containing approximately 1.6 times more balls, achieving rigidity that is nearly equivalent to that of a plain guide at low cost.

### About high-rigidity ball guide post sets

These products utilize a high-rigidity ball cage (MBBSH, MBJS) containing approximately 1.6 times more balls, achieving rigidity that is nearly equivalent to that of a plain guide at low cost.

---

**MBB**

- Devcon adhesive

**LBB**

- Loctite adhesive

Loctite No. 638/LOC638
Installing the bushing
Devcon adhesive
MBB
LBB
Loctite adhesive
Loctite No. 638

Ball guide post sets

High-rigidity ball guide post sets
No stopper
Movable stopper
Fixed stopper
RBSH
(RBSH)
RMSH
(RMSH)
RKXSH
(RKXSH)
RB
(RB)
RM
(RM)
RK
(RK)

Ball guide post sets
No stopper
Movable stopper
Fixed stopper
Aluminum cage
(Raise cage)

Catalog No.
Components
No.
QM
QB
RK
RM
RB
QK
QKSH
QBSH
RKSH
Aluminum cage
RB
RM
RK

When ordering by set, only the standard dimensions are available.
If dimensions other than standards are required, order alterations (P.795 ~ 799) to individual parts.

About high-rigidity ball guide post sets
These products utilize a high-rigidity ball cage (MBSH, MBJH) containing approximately 1.6 times more balls, achieving rigidity that is nearly equivalent to that of a plain guide at low cost.

Ordering code RM25 12 L8 ② ④ E FL

Components
MMP, BRPM, BRPK

Price

When ordering by set, only the standard dimensions are available.
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About high-rigidity ball guide post sets
These products utilize a high-rigidity ball cage (MBSH, MBJH) containing approximately 1.6 times more balls, achieving rigidity that is nearly equivalent to that of a plain guide at low cost.
BALL GUIDE POST SETS FOR DIE SETS
PRESS-FIT POST TYPE

High-rigidity ball guide post sets
- No stopper
- Movable stopper
- Fixed stopper

Components
- MSP
- GBSH
- MBSH
- GKB

Ball guide post sets
- No stopper
- Movable stopper
- Fixed stopper

Components
- PB
- PM
- PK

Components
- GB
- GM
- GK

RELATED PRODUCTS
- MBSH, MBJH
- MSP, GBSH
- MBJ, MBK
- SWP
- STK

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About high-rigidity ball guide post sets
These products utilize a high-rigidity ball cage (MBSH, MBJH) containing approximately 1.6 times more balls, achieving rigidity that is nearly equivalent to that of a plain guide at low cost.
BALL GUIDE POST SETS FOR DIE SETS
PRESS-FIT POST TYPE

High-rigidity ball guide post sets
No stopper Movable stopper Fixed stopper
PBSDH (GSBH) MBSP STM
PKSH (GKSH) GBSP STM
GMSH (GKSH) PSTK
PBSH (PSTK) PKSH (PSTK)
GMBH (GMSH) PBGM
PM (PM)

Ball guide post sets
No stopper Movable stopper Fixed stopper
PBSDH (GSBH) MBSP STM
PKSH (GKSH) GBSP STM
GMSH (GKSH) PSTK
PBSH (PSTK) PKSH (PSTK)
GMBH (GMSH) PBGM
PM (PM)

ORDERING CODE
GBSH 25 15 L6
GBSH 25

INSTALLING THE BUSHING
Adhesives
LOC638 A5056

POM

Einsetzen der Buchse
Adhäsiva
LOC638 A5056

When ordering by set, only the standard dimensions are available.
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About high-rigidity ball guide post sets
These products utilize a high-rigidity ball cage (MBSH, MBJH) containing approximately 1.6 times more balls, achieving rigidity that is nearly equivalent to that of a plain guide at low cost.
PLAIN GUIDE POST SETS FOR DIE SETS

- DETACHABLE POST TYPE -

**Catlog No. L RD Type BL**

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When ordering by set, only the standard dimensions are available. If dimensions other than standards are required, order alterations (P.795 ~ 806) to individual parts.

---

**Related Products**

P.797~799

---

**Ordering Information**

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**Price**

Quotation

---

**Plain Guide Oil-free (MoS2) Copper alloy laminated Oil-free (MoS2)**

---

**Specifications**

- Plain guide: MRP (P.795)
- Oil-free: LDBZ (P.805)
- Copper alloy laminated: LFBZ (P.805)

---

**Bushing Installation**

- Adhesives: (P.808)
- MDB: Devcon adhesive
- LDBZ: Loctite adhesive (Loctite No.638)
  - LDB: Loctite adhesive (Loctite No.638)

---

**Dimensions**

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**Supported Materials**

- MDB: SUJ2, 58HRC (Induction hardening)
- LDBZ: MoS2 (embedded)
- LFBZ: MoS2 (embedded)
- Copper alloy: 45HRC
- Grease nipple GPA6A

---

For further information, please refer to the manufacturer's specifications and guidelines.
**PLAIN GUIDE POST SETS FOR DIE SETS**

---

**DETACHABLE POST TYPE**

- **Related Products**: P.797~799

---

### Catalog No. Components

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- **Plain Guide Oil-free (MoS2)**
- **Copper alloy laminated Oil-free (MoS2)**

---

### Installation of the bushing (Adhesives)**

- **MDB**: Lacquer adhesive
- **LDB**: Lacquer No. 830 (LDB830)
- **LDBZ**: Lacquer No. 830 (LDB830)

---

**Ordering Code**

- **RD**
- **RZ**
- **RF**
- **RFZ**

---

**Price Quotation**

---

**Days to Ship**

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**Catalog No.**

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**Specifications**

- **Blade Type**
- **Blade Material**
- **Blade Hardness**
- **Blade Dimensions**
- **Blade Tolerances**

---

**Ordering Code**

- **RD**
- **RZ**
- **RF**
- **RFZ**

---

**Additional Information**

- **When ordering by set, only the standard dimensions are available.**
- **If dimensions other than standards are required, order alterations (P.795 ~ 806) to individual parts.**

---

---

---

---

---
PLAIN GUIDE POST SETS FOR DIE SETS
PRESS-FIT POST TYPE

When ordering by set, only the standard dimensions are available. If dimensions other than standards are required, order alterations (P.795 ~ 806) to individual parts.

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Installing the bushing (Adhesives [P.808])

### Catalog No.

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Ordering code: PD 28 16 M8

Plain guide Oil-free (MoS2) Copper alloy laminated Oil-free (MoS2)

Plain guide Oil-free (MoS2) Copper alloy laminated Oil-free (MoS2)
### Catalog No. Components

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### Related Products

- **MSP**
  - SUJ2 ~ 58HRC (Induction hardening)

- **MDB**
  - SUJ2 ~ 58HRC

- **LDB**
  - SUJ2 ~ 58HRC

- **LFB**
  - SUJ2 ~ 58HRC

- **LFBZ**
  - SUJ2 ~ 58HRC

### Ordering Code

- **PD**
  - L80

- **PZ**
  - L80

- **PF**
  - L80

- **PFZ**
  - L80

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**PLAIN GUIDE POST SETS FOR DIE SETS**

**PRESS-FIT POST TYPE**

---

**When ordering by set, only the standard dimensions are available. If dimensions other than standards are required, order alterations (P.795 ~ 806) to individual parts.**
GUIDE POSTS FOR DIE SETS

**Detachable post type**

- **MRP**
  - For fixed stopper STK

- **BRPM**
  - For movable stopper STM

- **BSPM**

- **BSPK**
  - For fixed stopper STK

---

**Press-fit post type**

- **MSP**

- **BRPK**

- **BSPK**

---

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**Base unit price**

- **BRPK**
- **BSPK**
- **BSPM**
- **BRPM**
- **MRP**

---

**Provided bolt**

- **D1**
- **D2**
- **D3**
- **M1**
- **M8**
- **M12**
- **R**
- **SUJ2**

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**Catalog No.**

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**Glossary**

- **BSPM**: Induction hardening (Depth 1.5 – 2.5mm)

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**Price**

**Order**

**Days to Ship**

**Catalog No.**

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**Spec.**

**T Code**

**Quotation**

---

**Long type guide posts with configurable full length are listed on P.797.**
GUIDE POSTS FOR DIE SETS

--- Detachable post type ---

--- Press-fit post type ---

**Catalog No.**

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--- BSPK = Induction hardening (Depth 1.5 × 2.0mm) ---

--- Provided bull ---

--- MSP ---

--- HPK ---

--- BRPK ---
GUIDE POSTS FOR DIE SETS
— LONG TYPE, CONFIGURABLE FULL LENGTH —

### Detachable post type

- **MRP**
- **BRPM** (For fixed stopper STK)
- **BRPK** (For fixed stopper STM)
- **MSP** (For movable stopper STM)

### Press-fit post type

- **MSP**
- **BSPM**
- **BSPK**

#### Detachable post type

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#### Press-fit post type

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**Order**

**Days to Ship**

**Price**
### GUIDE POSTS FOR DIE SETS

#### LONG TYPE, CONFIGURABLE FULL LENGTH

#### Detachable post type

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#### Press-fit post type

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#### Table notes:

- **Base unit price**: 1 – 9 pieces
- **Catalog No.**: 1mm increments
- **Provided bolt**: 5
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
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- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
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- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
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- **SUJ2**: Depth 1.5
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- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
- **Induction hardening**: 58HRC
- **SUJ2**: Depth 1.5
- **Provided bolt**: 3
If there is only one groove remaining as the result of cutting, a second groove is added.

Do not use a cooling-fit for the bushings. In the same way as with sub-zero treatment, cooling causes residual austenite to transform into martensite and expand. This expands both the bushing inner and outer diameters, rendering the bushing unusable.

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If there is only one groove remaining as the result of cutting, a second groove is added.
BALL GUIDE BUSHINGS FOR DIE SETS

**MBB (Devcon adhesive type)**

- Do not use a cooling-fit for the bushings. In the same way as with sub-zero treatment, cooling causes residual austenite to transform into martensite and expand. This expands both the bushing inner and outer diameters, rendering the bushing unusable.

**LBB (Loctite adhesive type)**

- Do not use a cooling-fit for the bushings. In the same way as with sub-zero treatment, cooling causes residual austenite to transform into martensite and expand. This expands both the bushing inner and outer diameters, rendering the bushing unusable.

---

**BALL GUIDE BUSHINGS FOR DIE SETS —DETACHABLE TYPE—**

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**Price**

- 0.010
- 0.007
- 0.004
- 0.002
- 0.001
- 0.0005
- 0.0002
- 0.0001

---

**RBB (Detachable type)**

- Do not use a cooling-fit for the bushings. In the same way as with sub-zero treatment, cooling causes residual austenite to transform into martensite and expand. This expands both the bushing inner and outer diameters, rendering the bushing unusable.

**Catalog No.**

<table>
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**Price**

- 0.015
- 0.020
- 0.025
- 0.030
- 0.035

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**Sliding length**

- **Effective sliding length**
- **Press-in lead**

**Catalog No.**

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**Price**

- 0.015
- 0.020
- 0.025
- 0.030
- 0.035

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**Full length change**

- **LA dimension change**
- **LB dimension change**

**Catalog No.**

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**Price**

- 0.015
- 0.020
- 0.025
- 0.030
- 0.035
BALL GUIDE BUSHINGS FOR LOWER DIE SETS

**Figure 1: Lower die bushing and normal bushing**

**Figure 2: Regrinding of punch**

---

**Features of ball guide bushings for lower die sets**

- **Bushing**: The distance between punch and die plate and the guide post and bushing can be altered (A ≈ R).
- **Easy regrinding of punch and die**: Due to the short distance between the punch/die blade and the guide post, it is possible to perform regrinding without detaching the guide post.

---

**Screw guide end, it is possible to perform regrinding without detaching the guide post.**

---

**Table: Post-diameter d**

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**Catalog No.**

| LBB 50 | 120 |

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**Ball cage height**

- **For stripper guides: PD10**

---

**Table: Ball cages for die sets**

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**Order**

**Catalog No.**

| LBB 50 | 120 |

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**Order**

**Catalog No.**

| SWP8  | 50 |       |           |

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**Ball cages for die sets**

- **MBSH** (High rigidity aluminum ball cage)
- **MBJH** (High rigidity resin ball cage)

---

**Table: Ball cages for die sets**

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**Order**

**Catalog No.**

| MBSH 50 | 110 |       |           |

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**Ball cages for die sets**

- **MBSH** (Aluminum ball cage)
- **MBJH** (Resin ball cage)

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**Table: Ball cages for die sets**

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**Order**

**Catalog No.**

| MBSH 50 | 110 |       |           |

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**SToppers and Springs for Ball Guides**

**Features**
- Prevents lifting of the cage caused by the upward force of the spring, extending the lifetimes of guide post and bushing.

**Rings for Preventing Cage Lifting**

**Features**
- Prevents lifting of the cage caused by the upward force of the spring, extending the lifetimes of guide post and bushing.

**Tables**
- **Catalog No.**
- **Order**
- **Price**
- **Days to Ship**

**Figures**
- Cage lifting and movable stopper damage
- Effect of rings for preventing cage lifting

---

**Note:** The tables and figures are not fully transcribed due to the complexity and format of the original document. The content is summarized and represented in a more readable format.
STOPPERS AND SPRINGS FOR BALL GUIDES

RINGS FOR PREVENTING CAGE LIFTING

STM (Movable stopper)

STK (Fixed-type stopper)

- Determined according to the ball cage length.
- Black oxide (Fe3O4)

- Solid height: \( \frac{d}{2} + 2d \)

Features
Prevents lifting of the cage caused by the upward force of the spring, extending the lifetimes of guide post and bushing.

Figure 1: Cage lifting and movable stopper damage

Figure 2: Effect of rings for preventing cage lifting

**Features**
Prevents lifting of the cage caused by the upward force of the spring, extending the lifetimes of guide post and bushing.

**Figure 1:** Cage lifting and movable stopper damage
**Figure 2:** Effect of rings for preventing cage lifting

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Do not use a cooling-fit for the bushings. In the same way as with sub-zero treatment, cooling causes residual austenite to transform into martensite and expand. This expands both the bushing inner and outer diameters, rendering the bushing unusable.
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## SHANKS FOR DIE SETS

### MSK
- With hexagon hole

### MSKS
- With hexagon hole and taper

### MSKTP
- With hexagon hole and taper

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## DIE ADHESIVE

### LOC638 — 250
- Loctite No. 638
- 250mℓ

### LOC638 — 500
- Loctite No. 638
- 500mℓ

### Applications (LOC638)
- Can be used for bonding:
  - Knock bushings (KNLB, KNLBB, LBB, LDB)
  - Die set bushings (LBB, LDB)
  - Stripper guide bushings (SGNB, SGBB, SGDB, SGFB, SGFZ)

### MSK MSKS MSKTP

### Fluid color
- Main ingredient
- Viscosity (cP)
- Service temperature range

### Catalog No.
- Volume (mℓ)
- Base unit price

<table>
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<th>Catalog No.</th>
<th>Volume (mℓ)</th>
<th>Base unit price</th>
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### Applications
- ・Can be used for bonding:
  - Knock bushings (KNLB, KNLBB, LBB, LDB)
  - Die set bushings (LBB, LDB)
  - Stripper guide bushings (SGNB, SGBB, SGDB, SGFB, SGFZ)

### Strength
- Shear strength: 25~35 (N/mm²)
- Recommended clearance at one side: 0.01~0.03mm
- Hardening method: Room temperature

### Degreasing
- Degreasing is recommended before application of Loctite adhesives.

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### Table

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<th>C</th>
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<th>Type</th>
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### Order Catalog No.
- MSK 50

### Price
- LOC 638 — 50

### Alteration
- Code: MLC
- Spec. ML dimension change: M & MLC < ML
- 1mm increments
SHANKS FOR DIE SETS

DIE ADHESIVE

LOCTITE 638—250
LOC638—50

Applications (LOC638):
- Can be used for bonding knock bushings (KNLB, KNLBB), die set bushings (LBB, LDB), and stripper guide bushings (SGBL, SGBZ, SGHZ, SGFB, SGFZ).

Strength:
- Recommended maximum tolerances ((mm):
  - Active surface: 0.01—0.03
  - Inert surface: 3—6

Note:
1. Generally, when a die part is press-fit, it is bonded with a clearance of 0.01—0.03 mm on one side.
2. This is the time required until a serviceable strength (50% hardening) is reached.
3. Service temperature range: -55—125℃

Shear strength:
- 25—35 N/mm²

Viscosity:
- 0.01—0.03 cP

Recommended bond line opening (%)
- 1—3

Order:
- Catalog No. LOC 638
- 50

Price:
- Quotation

Catalog No. Volume
- LOC 638 250 50

Fluid color:
- Green

Main ingredient:
- Anaerobic resin

Shear modulus:
- 10—28

Service temperature:
- -55—125℃

Hardening time:
- 1—3

Hardening method:
- Room temperature

Order Catalog No. Amount
- LOC 638 50

Diameter
- 12
- 17

B C L NL M L1 L2 Type D—M Catalog No. Base unit price 1—10 pieces

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</table>

Alteration Code Spec. TCode
- ML: ML dimension change
- MSK: MSK dimension change
- MSKTP: MSKTP dimension change

MLC: 1 mm increments

Note:
- Degreasing is recommended before application of Loctite adhesives.