Clamp molds instantly with super

Pascal mag clamp is a mold clamp system for injection molding. The clamp plate is one set of two plates for movable platen and...
strong permanent magnet!
machines that clamps the mold with powerful magnet force.
fixed platen sides.

Clamp plate for fixed platen
Displacement detection core
Magnet core

No need to unify the mold sizes
Clamping mold instantly (0.5 - 4.5 sec)
Mag clamp structure and function

- Clamp (Magnetized)

- Unclamp (Demagnetized)

1. Electromagnetic coil is energized for **0.5 sec.**
2. Polarity of alnico magnet is inverted.
3. Neodymium magnet and alnico magnet become homopolar.
4. Magnet core becomes a strong magnet to clamp the mold.

1. Electromagnetic coil is energized for **0.5 sec.**
2. Polarity of alnico magnet is inverted.
3. Magnetic flux of neodymium magnet and alnico magnet is not emitted from the surface of the magnet core so that the mold can be unclamped.

Lines of magnetic flux

- Neodymium magnet
  - Super strong permanent magnet
- Alnico magnet
  - Polarity is inverted by electromagnetic coil
- Electromagnetic coil
  - Inverts the polarity of alnico magnet
- Magnet core
  - Powerfully adheres mold

Mold

Mold plate

1. Effective height of magnetic flux: Approx **20 mm**
2. Plate thickness
   - 35 mm
   - 50 mm
   - 52 mm

Mag clamp structure and function
Mag clamp advantages

- Mold can be adhered and detached instantly (0.5-4.5 seconds).
- Energization required only when switching on and off. No energization required during clamped condition. No electricity consumed, thus no heat generation.
- Once the mold is clamped, unclamping (demagnetization) will not occur even when a power failure or power cable breakage occur.
- Magnetic force of permanent magnet will not decrease through aging. Clamping force is maintained for long-term use.
- Clamp plate has no moving parts, thus assuring high durability. Plate interior is maintenance-free.
- Clamp force is evenly applied on all faces of the magnet core. No gaps are created between the machine’s platen surface and center part of the mold which helps improve molding accuracy.

Conventional

- Only the edge is clamped.

Mag clamp

- The entire surface is absorbed.

- No need to unify the mold sizes. (Note that clamping force is dependent on the size of mold plate.)

Vertical

No need to attach a spacer

No need to remake a mold plate
Mag clamp advantages

- The effective height of magnetic flux is about 20 mm above clamp plate surface. Magnetic field does not cause significant effect inside the mold.
- No magnetic field is generated from the sides or back of the clamp plate. So the injection nozzle and controller are not affected.

![Lines of magnetic flux](image)

- Effective height of magnetic flux: Approx 20mm

- The mounting space for other retrofittable clamp is not required, and machine platen surface can be maximized for the mold.

![Conventional vs Mag clamp](image)

There are interferences.
Even if the mold height is not unified, the horizontal loading is feasible by simply adjusting the load level.

**Mag clamp advantages**

- The reproduction of mold plate is required.

- Only a spacer is added.
### Mag clamp specifications

#### Model designation

<table>
<thead>
<tr>
<th>Loading direction</th>
<th>Clamp plate size</th>
<th>Clamp plate thickness</th>
<th>DD mag clamp</th>
<th>Diameter of locate ring (mm)</th>
<th>Power voltage</th>
<th>Language on operation panel</th>
<th>Operating temperature</th>
<th>Surface treatment</th>
<th>Special specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Vertical loading</td>
<td>3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B: Horizontal loading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Example: MG A 0020 S - 2 2 J H N

### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>MG[]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin-model</td>
<td>32×100mm</td>
</tr>
<tr>
<td>50× 50mm</td>
<td>2.45kN</td>
</tr>
<tr>
<td>100×100mm</td>
<td>7.84kN</td>
</tr>
<tr>
<td>Standard</td>
<td>70× 70mm</td>
</tr>
<tr>
<td>75× 75mm</td>
<td>7.84kN</td>
</tr>
<tr>
<td>115×115mm</td>
<td>15.68kN</td>
</tr>
</tbody>
</table>

- **Operating temperature**: 0 ~ 80 (0 ~ 150 or 0 ~ 180 for heat proof type)
- **Magnetic flux height**: 20 (mold plate material SS400)
- **Power supply voltage**: AC200 / 220V ±5% (50/60Hz)
- **Applicable machine**: For general injection molding machine
- **Plate mounting method**: Bolting with the tap holes of machine platens
- **Displacement detection system (movable side & fixed side)**: Include

- Additional tap holes are required in the middle of machine platens.
- Operating temperature indicates the temperature on the surface of the clamp plate.

### Accessories

- Locate ring (fixed side only)
- Mold fall protection block (movable side only)
- Operation panel model ESMD
- Control box model EMGD
- Control cables
- Interlock

### Option

- Non standard voltage arrangement (50/60Hz)
- AC380V ±5%
- AC440V ±5%
- AC480V ±5%
- High temperature
  - 0 ~ 150°C
  - 0 ~ 180°C
- Rust proof, polish arrangement for clamp plate
- Mold fall protection hook model MGR (movable side & fixed side)
- Additional magnet core
- Special core layout
- Horizontal loading arrangement
- DD mag clamp
## Mag clamp specifications

<table>
<thead>
<tr>
<th>Clamp plate</th>
<th>Mold fall protection hook</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>Eye bolt on mold</strong></td>
</tr>
<tr>
<td>MGA0020S</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>32</td>
</tr>
<tr>
<td>MGA0030S</td>
<td>39</td>
</tr>
<tr>
<td>300 ~ 350</td>
<td>40</td>
</tr>
<tr>
<td>MGA0040S</td>
<td>49</td>
</tr>
<tr>
<td>400 ~ 550</td>
<td>45</td>
</tr>
<tr>
<td>MGA0050S</td>
<td>61</td>
</tr>
<tr>
<td>500 ~ 600</td>
<td>61</td>
</tr>
<tr>
<td>MGA0060S</td>
<td>83</td>
</tr>
<tr>
<td>700 ~ 800</td>
<td>96</td>
</tr>
<tr>
<td>MGA0070S</td>
<td>123</td>
</tr>
<tr>
<td>800 ~ 900</td>
<td>140</td>
</tr>
<tr>
<td>MGA0080S</td>
<td>169</td>
</tr>
<tr>
<td>900 ~ 1000</td>
<td>197</td>
</tr>
<tr>
<td>MGA0090S</td>
<td>201</td>
</tr>
<tr>
<td>1000 ~ 1100</td>
<td>236</td>
</tr>
<tr>
<td>MGA0100S</td>
<td>269</td>
</tr>
<tr>
<td>1100 ~ 1200</td>
<td>292</td>
</tr>
<tr>
<td>MGA0110S</td>
<td>350</td>
</tr>
<tr>
<td>1200 ~ 1300</td>
<td>475</td>
</tr>
<tr>
<td>MGA0120S</td>
<td>473</td>
</tr>
<tr>
<td>1300 ~ 1400</td>
<td>535</td>
</tr>
<tr>
<td>MGA0130S</td>
<td>535</td>
</tr>
<tr>
<td>1400 ~ 1500</td>
<td>654</td>
</tr>
<tr>
<td>MGA0140S</td>
<td>654</td>
</tr>
<tr>
<td>1500 ~ 1600</td>
<td>823</td>
</tr>
<tr>
<td>MGA0150S</td>
<td>823</td>
</tr>
<tr>
<td>1600 ~ 1700</td>
<td>1036</td>
</tr>
<tr>
<td>MGA0160S</td>
<td>1036</td>
</tr>
<tr>
<td>1700 ~ 1800</td>
<td>1155</td>
</tr>
<tr>
<td>MGA0170S</td>
<td>1155</td>
</tr>
<tr>
<td>1800 ~ 1900</td>
<td>1434</td>
</tr>
<tr>
<td>MGA0180S</td>
<td>1434</td>
</tr>
<tr>
<td>1900 ~ 2000</td>
<td>1964</td>
</tr>
<tr>
<td>MGA0190S</td>
<td>1964</td>
</tr>
<tr>
<td>2000 ~ 2100</td>
<td>2262</td>
</tr>
<tr>
<td>MGA0200S</td>
<td>2262</td>
</tr>
<tr>
<td>2100 ~ 2200</td>
<td>2262</td>
</tr>
<tr>
<td>MGA0210S</td>
<td>2262</td>
</tr>
</tbody>
</table>

### Notes

*1: Total clamping force per clamp plate with the condition that the mold plate is contacting all the magnet cores.

*2: Suitable for the small size of injection molding machine with small daylight.

*3: The value indicates kVA at 200/220V AC. Contact Pascal for details in case the voltage is 380, 440 and 480V AC.

*4: It is reference value in case of the production under the general condition. It is not the value guaranteed.

*5: The size of eye bolt on the mold is determined according to the size of the hook. Make sure that allowable load of eye bolt is greater than the mold weight.

*6: The number of eye bolts on mold side indicates one per mold (movable side & fixed side).
Mag clamp system configuration

Vertical loading

- Mold fall protection hook
- Clamp plate for movable platen
- Clamp plate for fixed platen
- Operation panel for magnet clamp

Clamp plate for movable platen
Clamp plate for fixed platen
Control box
Operation panel
Power supply
Machine
Horizontal loading

Positioning cylinder

Clamp plate for fixed platen

Clamp plate for movable platen

Operation panel for magnet clamp

Mold die changer

Mag clamp system configuration
Mag clamp operation panel

Operation panel

Compact and user-friendly operation panel exclusively designed for magnetic clamp. It is mountable on IMM or wall of IMM utilizing the tap holes at the rear side. (M4 bolts x 4 accessories)

[ For vertical loading ]

**model ESMD-A**

[ Image of ESMD-A ]

[ For horizontal loading ]

**model ESMD-B**

[ Image of ESMD-B ]

<table>
<thead>
<tr>
<th>Model</th>
<th>ESMD-A</th>
<th>ESMD-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading direction</td>
<td>Vertical loading</td>
<td>Horizontal loading</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Mounting bracket

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L type</strong></td>
<td>105 x 20 x 140</td>
</tr>
<tr>
<td><strong>Self-standing type</strong></td>
<td>100 x 60 x 170</td>
</tr>
<tr>
<td><strong>Wall mount type</strong></td>
<td>100 x 160 x 60</td>
</tr>
<tr>
<td><strong>Hang down type</strong></td>
<td>100 x 190 x 60</td>
</tr>
<tr>
<td><strong>Embedded type</strong></td>
<td>140 x 62.3 x 150</td>
</tr>
</tbody>
</table>

Operation panel dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 x 100 x 35</td>
</tr>
</tbody>
</table>
Mag clamp control box

Control box

model EMGD

<table>
<thead>
<tr>
<th>Model</th>
<th>EMGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>kg</td>
</tr>
<tr>
<td></td>
<td>25 ~ 80</td>
</tr>
</tbody>
</table>

Mounting bracket

Wall mount type

Self-standing type

Hang down type

Interlock

Safety interlocks listed below are built in the electric control circuit for mold change operation.

- When changing a mold, Mag clamp operation is feasible only when the following conditions are prepared.
  
  Mag clamp : ① Mold change mode  
  Molding machine : ② Set-up (or manual) mode ③ Nozzle retracted ④ Ejector retracted ⑤ Platen closed-end ⑥ Safety door closed

- Conditions ②, ③ and ⑤ on molding machine can be checked by LED on the operation panel.

- During automatic operation
  
  If the mold is displaced or detached from the clamp plate, the molding machine is immediately stopped by the displacement detection function.
Mag clamp can clamp the mold strongly optimizing the magnet core layout.

Adopting 4 different size and shape of magnet core, Pascal ideally layouts the core on the clamp plate according to the machine platen size specifically providing the core at the center of the plate so that the plate can rigidly hold the mold.

In order to secure strong and stable clamp force for even a small size of mold, in some models, large size of core is provided at the center of the plate on movable platen. **PAT.**

Displacement detection system (standard) **PAT.**

Displacement or lifting of the mold can be detected by the electromagnetic coils being built in the magnet core located near the center of clamp plates. When the mold moves, these electromagnetic coils detect an induction current signal.

Clamp force calculation

The clamp force of Mag clamp is determined by the contact area of magnetic core (number of magnet core) with a mold. The force decrease when contact area is decreased by a cutout or holes provided to the mold. In addition to it, operating temperature over 80°C and material of mold plate are also definite factors to have the clamp force decrease. (**Refer to page 85** for calculation of rated clamping force.)
Mold fall protection hook (length adjustable) model MGR (optional)

With a easily adjustable chain

Stopper
Base block
Length adjustable
Hook

DD Mag clamp (optional)

The clamp with DD sensor which can numerically check the mold. It can detect the clamp force decrease caused by heat, mold base material and a clearance between the mold and magnet core face. Refer to page → 34

Check point to prevent mold fall

It is a significant factor in mold-fall to make ejector setting error. Check if stroke and position of ejector pin are correct and no misalignment with pin hole referring to caution plate. The caution plate is available for machine operators.

Pascal mag clamp

Check the following points to avoid the mold to fall.
- If ejector pin is vertically positioned, the mold may be pushed to fall.
- When confirming, lift the mold and move the ejector pin manually.

Caution plate
Enlarge  Refer to page → 83
**DD mag clamp**

**Smart sensor checks the mold DD mag clamp**

The clamp with DD sensor which can numerically check the mold. It can detect the clamp force decrease caused by heat, mold base material and a clearance between the mold and magnet core face.

As for DD mag clamp, the status indicator is added to the control box.

* Mold displacement detection system  Refer to page → 32

**Normal clamping status**

The sensor indicates AA which means the mold has adequate size, material and temperature are appropriate to clamp and there is no gap between the magnetic surface and mold.

**Size detection**

Detect too small mold

<table>
<thead>
<tr>
<th>Clamp force (kN)</th>
<th>Recommended Min. mold size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>280 × 280</td>
</tr>
<tr>
<td>1800</td>
<td>330 × 330</td>
</tr>
<tr>
<td>3500</td>
<td>475 × 475</td>
</tr>
<tr>
<td>4500</td>
<td>565 × 565</td>
</tr>
<tr>
<td>6500</td>
<td>635 × 635</td>
</tr>
<tr>
<td>8500</td>
<td>710 × 710</td>
</tr>
<tr>
<td>10500</td>
<td>790 × 790</td>
</tr>
<tr>
<td>13000</td>
<td>855 × 855</td>
</tr>
</tbody>
</table>

*Contact Pascal for details.*
**Gap detection**

Clamp force decrease due to the gap

**Clearance detection**

Clamp force decrease due to a clearance

---

Dents and Foreign material biting

Cutout (including screw hole)

---

The sensor output abnormal signal when clamp force decreases more than 20% due to gap or clearance.

---

**Material detection**

Clamp force decrease due to the material that are not easily magnetized.

**High temperature detection**

Clamp force decrease due to the mold heat-up

---

Cast iron Martensite stainless steel

Mold becomes hot

---

Simply type of material or mold temperature does not make the clamping force decrease lower than 80% however the value goes down due to the force decrease.
The introduction of **Mag clamp** in the vertical IMM **eliminates bolting job** *(temporary tightening, retightening)* **in the limited space of the machine** and realizes shortening the set up time considerably.

No need to screw / unscrew in a limited space.
Mag clamp for vertical IMM

750kN (75ton) vertical IMM (rotary) Mag clamp for lower mold

Displacement detection core
Magnet core
Rollers
Positioning block
Lower clamp plate

Magnet core
Lower clamp plate
Rollers
Guide block
Displacement detection core

Mold (large size)
Mold (small size)
No need to unify the mold sizes
Mag clamp for lower mold mold loading procedure

① Loading the master mold
②-1 Lower Mag clamp ON
②-2 Table rotates
③-1 Table stops rotating
③-2 Lower Mag clamp OFF

④-1 Mold clamped by platens with Mag clamp OFF
④-2 Upper Mag clamp ON
⑤ Lower Mag clamp ON
⑥ Lower mold to be positioned by the procedure of ② to ⑤

The system can be securely operated with safety interlock.
The above procedure is explained at upper mold basis.
Contact Pascal for lower mold basis procedure.
Mag clamp for vertical IMM

 Clamp plate

 Clamp plate for upper mold (fixed table)  Clamp plate for lower mold (rotary table)

 Displacement detection core

 Operation panel for Vertical IMM

 model ESMD-C  model ESMD-E

 Control box

 Operation panel Model

<table>
<thead>
<tr>
<th></th>
<th>ESMD-C</th>
<th>ESMD-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>Mag clamp</td>
<td>Upper mold : Air</td>
</tr>
<tr>
<td>Lower</td>
<td>Mag clamp</td>
<td>Lower mold : Mag</td>
</tr>
<tr>
<td></td>
<td></td>
<td>clamp</td>
</tr>
</tbody>
</table>
Mold change with no work in the machine

Shortening the set up time to 45 min in 250 ton class

Mold displacement Detectable

6,000kN (600 ton) Two-color IMM vertical loading  Mag clamp
Mag clamp for two-color IMM

Hand tightening method
It takes long time because an operator has to install / remove bolts many times at a narrow space in a machine.

Mold changing time: 60min (250 ton class)

- Easy to drop tools.
- Limited power exertion.
- No visual
- Need to move to operation / non-operation side to install / remove bolts.
- Install bolts many times.

Mag clamp
Clamp instantly by magnetic force with no work in the machine.

Mold changing time: 15min (250 ton class)

- Simply use the operation panel to clamp and unclamp the mold.
- With no work in the machine.
- Mold changing is done in only 15 minutes.

The moving picture of mold change operation for two-color IMM with mag clamp is being uploaded in Pascal web site.
Mag clamp for two-color IMM

Vertical loading

[Diagram of vertical loading]

Horizontal loading

[Diagram of horizontal loading]

Mold plate
Primary mold
Secondary mold
Mag clamp

Mold die changer
(Manual, Non track, Non elevated table type)
Clamp plate

Clamp plate for movable platen

Clamp plate for fixed platen

Displacement detection core

Operation panel for two-color IMM

Control box

Model ESMD-D

Operation panel Model

ESMD-D

Operation panel for two-color IMM

- It enables operation of 4 plates individually.
Mold mounting and coupler connecting at once

**Coupler built-in mag clamp**

The introduction of coupler in the magnet plate realizes the automatic clamping and coupling system at once. The mold production cost can be reduced, as the drive part of coupler and lock guide mechanism are not required. In addition, the mold modification and standardization of new design can be performed easily, as it can be introduced without any concerns about the interference between the clamp and mold or platen.

**Process reduction**

**Space saving**
**Coupler built-in mag clamp**

---

**In case of automatic clamping and auto coupler**

- Automatic clamp
- Auto coupler at machine side
- Mount space for the automatic coupler
- Safety door
- Auto coupler at mold side
- Mount space for the automatic clamp
- Mold plate
- Lifting table type

---

**In case of coupler built in mag clamp**

- Clamp plate
- Coupler embedded side (clamp plate side)
- Safety door
- Mold plate
- Coupler mounted side (mold side)
- Lifting table type

---

- The space for screw bolt and installation of clamp is eliminated by means of the mag clamp.
- Built-in coupler in the mag clamp allows to eliminate the space for the drive part of coupler and lock guide mechanism.
Coupler built in mag clamp

Structure and Function

At clamp (Magnetized)
Coupler at connection

At unclamp (Demagnetized)
Coupler at disconnection

1. Mold set
2. Clamp ON
3. Pilot pressure ON (Flow path open)
4. Fluid circulation starts

Fluid circulation stops
Pilot pressure OFF
Clamp OFF
Remove mold

Specifications for mag plate

<table>
<thead>
<tr>
<th></th>
<th>Standard model</th>
<th>Thin model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Water, Air</td>
<td>Water, Air</td>
</tr>
<tr>
<td>Mounting method</td>
<td>Screw mounting</td>
<td>Mold side : Snap ring</td>
</tr>
<tr>
<td>Connection port</td>
<td>1/4”</td>
<td>1/2”</td>
</tr>
<tr>
<td>At connection</td>
<td>Max. working pressure MPa</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Proof pressure MPa</td>
<td>1.5</td>
</tr>
<tr>
<td>At disconnection</td>
<td>Max. working pressure MPa</td>
<td>No pressure maintaining</td>
</tr>
<tr>
<td></td>
<td>Mold side</td>
<td>* No liquid drip or spill</td>
</tr>
<tr>
<td></td>
<td>Machine side</td>
<td>No pressure maintaining</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* No liquid drip or spill</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>°C</td>
<td>0 ~ 95 (No freezing or boiling)</td>
</tr>
<tr>
<td>Allowable eccentricity</td>
<td>mm</td>
<td>±0.5</td>
</tr>
</tbody>
</table>
Operation panel Model

<table>
<thead>
<tr>
<th></th>
<th>ESMD-A</th>
<th>ESMD-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical loading</td>
<td>Horizontal loading</td>
<td></td>
</tr>
</tbody>
</table>

At the same time of clamp operation "ON" and "OFF", the coupler is connected and disconnected.
Mag clamp caution in use

- Do not use a mold with the plate that is deformed or warped. Clamp force decreases due to the gap between the mold plate and clamp plate.

- Be sure to use mag clamp by keeping the contact surfaces of mold plate and clamp plate always clean. Water or oil on the mag clamp may not cause a decrease of clamp force however dusts or foreign substances being attracted by a magnet may create a gap between the mold plate and clamp plate.

- In case that there are some dents on the contact surfaces of mold plate and clamp plate, remove the convex part using the oilstone.

Check the below to improve the safety

- Mag clamp generates a powerful magnetism. The person who is wearing a cardiac pacemaker is strictly prohibited to approach. Projecting height of magnetic flux above the clamp plate towards forward (to mold side) is just around 20 mm. However, be sure not to bring mobile phone, magnetic card or compact disc, etc. that are susceptible to magnetism close to the clamp plate to avoid a damage.

- Do not bring any magnetic substance such as ferrous metal close to the adherence surface when mag clamp is at clamping (magnetized). Due to the power of magnet, it may be adhered to the clamp surface, which may cause injury of fingers or hands.

![Diagram of Mag Clamp](image)

- Be sure to use an mold plate of which thickness is 25 mm or more. Although the projecting height of magnetic flux is around 20 mm, the following cautions should be considered when a mold plate is thinner than 25 mm.

  1. The clamping force may become decreased.
  2. The sensor which is easy to be influenced by magnetism has a possibility of malfunction.
  3. In case a moving parts is located within 25 mm above the mold displacement detection core, it may cause a malfunction of the mold displacement detection sensor.
Setting error of the ejector

Ejector setting error is a critical cause of the mold fall. A caution plate is provided for machine operators so that the operators can check the mounted position of ejector pin, stroke and displacement of pin hole.

Caution plate

**Pascal mag clamp**

Check the following points to avoid the mold to fall.

- If ejector pin is incorrectly positioned, the mold may be pushed to fall.
- When confirming, lift the mold and move the ejector pin manually.

<table>
<thead>
<tr>
<th>1</th>
<th>Wrong Position</th>
<th>2</th>
<th>Over-stroke</th>
<th>3</th>
<th>Displacement of Pin Hole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the position of ejector pin CORRECT?</td>
<td>Isn’t the length of ejector pin TOO LONG?</td>
<td>Does the mold mount PROPERLY?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recommended Ejector Setting Value**

Ejector force should be less than 1/3 against magnetic clamping force on movable platen side.

Ejector speed should be less than 50 mm/sec.
# Mag clamp caution in use

## In case of using the heat insulating plate

<table>
<thead>
<tr>
<th>Mount position</th>
<th>Between the platen and clamp plate</th>
<th>Between the mold and mold plate</th>
<th>Between the mold plate and clamp plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>○</td>
<td>○</td>
<td>Not available</td>
</tr>
<tr>
<td>Specifications of clamp plate</td>
<td>Heat proof type</td>
<td>*</td>
<td>Not available</td>
</tr>
</tbody>
</table>

* : It indicates the temperature transmitted to the mold plate.

---

### Available

- Between machine platen and clamp plate

![Diagram of available setup between machine platen and clamp plate](image)

### Available

- Between mold and mold plate

![Diagram of available setup between mold and mold plate](image)

### Not available

- Between mold plate and clamp plate

![Diagram of not available setup between mold plate and clamp plate](image)
Calculation of rated clamping force

The clamping force of Mag clamp (the adhering force of magnetic clamp) varies according to the area size (number of magnet core) where the mold plate and clamp plate contact. When loading a small mold of which mold plate does not contact all the magnet cores, the rated clamping force is obtainable by the calculation formula shown below. Refer to the following calculation example.

Example: Clamp plate model MGA0100 (movable side)

1. Magnet cores that the mold plate contacts with its entire area = 4 pcs
2. Magnet cores that the mold plate contacts with 1/2 of its area = 8 pcs
3. Magnet cores that the mold plate contacts with 1/4 of its area = 4 pcs
4. Total magnet cores that the mold plate contacts

\[= 4 \text{ pcs} + 8 \text{ pcs} \times \frac{1}{2} + 4 \text{ pcs} \times \frac{1}{4} = 9 \text{ pcs}\]

5. Clamping force per magnet core = 7.35 kN/pcs
6. Rated clamping force = 7.35 kN/pcs \( \times 9 \text{ pcs} = 66.15 \text{ kN}\)

- If there is a hole or notch at the bottom of mold plate, deduct the respective area from the total contact area (number of magnet core).
- The actual clamping force may be less than the rated force according to the conditions of mold plate.

(Regarding to the decline of clamping force refer to page \( \rightarrow \) 86)
**Mag clamp caution in use**

**Decline of clamping force**

According to the conditions of mold plate for the mold, the actual clamping force may become less than the rating. Before using mag clamp, be certain to calculate and acknowledge the decline of clamping force referring to the below tables and charts. And be sure to use in the strict condition that the actual clamping force is larger than the mold opening force of injection molding machine.

\[\text{Actual clamping force} = \text{Rated clamping force - Reduced force} \geq \text{Mold opening force of injection molding machine}\]

If the actual clamping force is not sufficient, replace the mold plate to a larger one to increase the contact area on the clamp plate.

<table>
<thead>
<tr>
<th>Material of mold plate</th>
<th>Clamping force</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS400</td>
<td>100% (rated)</td>
</tr>
<tr>
<td>SS45C</td>
<td>95%</td>
</tr>
<tr>
<td>S45C</td>
<td>85%</td>
</tr>
<tr>
<td>SK3 SUJ</td>
<td>80%</td>
</tr>
<tr>
<td>SUS430 FC250 FCD600</td>
<td>70%</td>
</tr>
<tr>
<td>SKH51 SKD11</td>
<td></td>
</tr>
</tbody>
</table>

The clamping force declines according to the materials of mold plate. S45C-H, SUJ, and FCD600 tends to be hard to come off at unclamping because the residual magnetic flux on the mold affects this however it should be improved once the clearance is created between the mold plate and clamp plate.

<table>
<thead>
<tr>
<th>Surface of mold plate</th>
<th>Clamping force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rz1.6 ~ 3.8</td>
<td>100% (rated)</td>
</tr>
<tr>
<td>Rz7.5 ~ 15.5</td>
<td>approx. 100%</td>
</tr>
<tr>
<td>Rz85 ~ 150</td>
<td>approx. 90%</td>
</tr>
</tbody>
</table>

The clamping force declines according to the grade of surface roughness in contact with the mold plate and clamp plate.

A dent or deformation of the mold plate creates a distance to the clamp plate, which will decrease the clamping capacity significantly.

If the temperature of mold plate becomes high, the clamping force significantly decreases. Keep the mold plate temperature below 80°C while it is clamped.