Adsorption Plate

Series SP

Specialized for adsorption and fixing in place of thin sheets, glass substrates, and soft workpieces.
Ideal for adsorption and fixing in place of thin sheets, glass substrates, and soft workpieces.

**Adsorption Plate**

1. **Adsorbs workpieces and holds them in place without leaving wrinkles, air bubbles or marks.**

   - Plate with holes: conventional
   - Adsorption Plate
   - Air vent
   - Suction

   - Adsorption of thin sheets
   - Plate with holes: conventional
   - Suction
   - No wrinkles or air bubbles are left on workpiece surfaces.

2. **High processing precision**

   - Plate with holes: conventional
   - Adsorption Plate
   - Air vent
   - Suction

   - Adsorption of soft workpieces
   - Plate with holes: conventional
   - Suction
   - No wrinkles or air bubbles are left on workpiece back side.

3. **High adsorption force**

   - Plate with holes: conventional
   - Adsorption Plate
   - Air vent
   - Suction

   - Peeling force (F)
   - Plate with holes: conventional
   - Adsorption Plate
   - Aperture ratio 5% or less
   - F₁ ≤ F₂
   - Aperture ratio 15% or more
   - F₁ < F₂

   - The entire surface area of the adsorption surface contains minute holes of ø0.12 mm at a density of approximately 1,300 holes per square centimeter.

   - This value represents the average diameter when air vents are converted to a circle.

   - Air vent
   - Suction
   - Suction
   - Vacuum pump

   - Body part
   - AC-4C (Aluminum casted)

   - Adsorption surface (Sintered metallic element)
   - Stainless steel 304

**Adsorption plate applications**

- Screen printing
- Others
- Semiconductors
- Dicing saws
- High-density mounting boards
- Electronic components
- LCDs
- Multi-layer condensers
- THD substrates
- Ceramic sheets
- Multi-layer substrates
- Glass substrates
- Ceramic sheets (before sintering)
- Probe
- Green sheets
- Other
Adsorption Plate

**Series SP**

**How To Order**

<table>
<thead>
<tr>
<th>Type</th>
<th>Rectangular</th>
<th>Rectangular</th>
<th>Rectangular</th>
<th>Rectangular</th>
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<th>Rectangular</th>
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<td>SP2130</td>
<td>SP3130</td>
<td>SP4130</td>
<td>SP5130</td>
<td>SP6130</td>
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<td>SP7230</td>
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<td>SP2330</td>
<td>SP3330</td>
<td>SP4330</td>
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<td>SP3530</td>
<td>SP4530</td>
<td>SP5530</td>
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<td>SP5630</td>
<td>SP6630</td>
<td>SP7630</td>
</tr>
</tbody>
</table>

**Shape**

1. Rectangular
2. Square

**Adsorption surface size**

- 1: 50 x 50 mm
- 2: 100 x 100 mm
- 3: 150 x 150 mm
- 4: 200 x 200 mm
- 5: 250 x 250 mm
- 6: 300 x 300 mm

**Sintered metallic element particle diameter**

- 30 ø0.3 standard

**Standard specifications**

- Suitable for adsorption and fixing in place of film and soft sheets
- High processing precision (adsorption surface)
- Large, evenly distributed adsorption force

**Circuit example**

- Air source
- Supply valve
- Vacuum ejector
- Suction port
- Switching valve
- Vacuum source

**Approved**

- ZA
- ZX
- ZR
- ZM
- ZMA
- ZQ
- ZH
- ZU
- ZL
- ZY
- ZP
- ZP
- SP
- ZCUK
- AMJ
- AMV
- AEP
- HEP
- Related Equipment

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### Series SP

**Rectangular/SP1□30**

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Adsorption surface size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1130</td>
<td>□50 x 50</td>
<td>80</td>
<td>110</td>
<td>20</td>
<td>50</td>
<td>65</td>
<td>95</td>
<td>70</td>
<td>5</td>
</tr>
<tr>
<td>SP1230</td>
<td>□100 x 100</td>
<td>130</td>
<td>160</td>
<td>20</td>
<td>100</td>
<td>115</td>
<td>145</td>
<td>95</td>
<td>9</td>
</tr>
</tbody>
</table>

**Part no.**

| 1244 |

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Adsorption Plate *Series SP*

**Square/SP2 30**

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Adsorption surface size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP2130</td>
<td>□50 x 50</td>
<td>80</td>
<td>80</td>
<td>20</td>
<td>50</td>
<td>65</td>
<td>65</td>
<td>55</td>
<td>5</td>
</tr>
<tr>
<td>SP2230</td>
<td>□100 x 100</td>
<td>130</td>
<td>130</td>
<td>20</td>
<td>100</td>
<td>115</td>
<td>115</td>
<td>80</td>
<td>9</td>
</tr>
</tbody>
</table>

**Dimensions:**
- **A**
- **B**
- **C**
- **D**
- **E**
- **F**
- **G**

**Notes:**
- 4 x 5.5 drill
- 9.5 depth of counter bore 7 (mounting hole)
- Rc 1/8 (Suction port)
- Element fixing nut N pcs.

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**Series SP**

**Made to Order 1**

Please contact SMC for detailed specifications, delivery and pricing.

1. **Changeable Suction Port Position and Element Type (Particle Diameter)**

   **How To Order**

   - **SP 1130**
   - **Port position**
     - A: Standard (back side)
     - B: Rectangular A position
     - C: Rectangular B position
     - D: Square A position
   - **Particle diameter**
     - A: Standard (ø0.3)
     - B: ø0.2
     - C: ø0.4
   - **Sintered metallic element particle diameter**
     - 30: ø0.3 standard

   **Caution**
   1. This item has made to order specifications including a particle diameter differing from standard items, and a suction port on the side.
   2. Refer to the table for the port position dimensions on the side. The back side port is plugged with a Tapered Screw Plug.
   3. There are no differences in aperture ratio or adsorption force due to changes in particle diameter of elements.

   - **Adsorption plate**
     - 1: Rectangular
     - 2: Square
   - **Adsorption surface size**
     - 1: 50 x 50 mm
     - 2: 100 x 100 mm
     - 3: 150 x 150 mm
     - 4: 200 x 200 mm
     - 5: 250 x 250 mm
     - 6: 300 x 300 mm

   - **Particle diameter**
     - ø0.2
     - ø0.3
     - ø0.4

   - **When particle diameter and port position are both standard, neither of them are specified.**
Side port position

Rectangular (Select either A or B.)

Special Order Products

Products with a stainless steel body or in other shapes can be manufactured. Consult SMC separately.

Manufacturable Range

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Square board</th>
<th>Circular board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perpendicular</td>
<td>Horizontal B</td>
<td>Diameter dD (mm)</td>
</tr>
<tr>
<td>A (mm)</td>
<td>A (mm)</td>
<td>20 to 350</td>
</tr>
<tr>
<td>under 20 to 50</td>
<td>200 or less</td>
<td></td>
</tr>
<tr>
<td>under 50 to 100</td>
<td>300 or less</td>
<td></td>
</tr>
<tr>
<td>under 100 to 150</td>
<td>350 or less</td>
<td></td>
</tr>
<tr>
<td>under 150 to 200</td>
<td>400 or less</td>
<td></td>
</tr>
<tr>
<td>under 200 to 250</td>
<td>450 or less</td>
<td></td>
</tr>
<tr>
<td>under 250 to 370</td>
<td>500 or less</td>
<td></td>
</tr>
</tbody>
</table>

Recommended Body Thickness

<table>
<thead>
<tr>
<th>Body area (cm²)</th>
<th>Thickness (mm)</th>
<th>Equivalent size</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 or less</td>
<td>14</td>
<td>100 x 100</td>
</tr>
<tr>
<td>361 or less</td>
<td>16</td>
<td>190 x 190</td>
</tr>
<tr>
<td>625 or less</td>
<td>18</td>
<td>250 x 250</td>
</tr>
<tr>
<td>900 or less</td>
<td>20</td>
<td>300 x 300</td>
</tr>
<tr>
<td>Over 900</td>
<td>23</td>
<td>—</td>
</tr>
</tbody>
</table>

Order a thickness equal to or greater than that shown on the table. If the thickness is less than that shown, the product may not be able to be manufactured, due to warping.

Degree of Flatness (reference value)

<table>
<thead>
<tr>
<th>Body area (cm²)</th>
<th>Flatness (mm)</th>
<th>Parallelism (mm)</th>
<th>Equivalent size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless steel</td>
<td>Aluminium</td>
<td>Stainless steel</td>
<td>Aluminium</td>
</tr>
<tr>
<td>529 or less</td>
<td>0.010</td>
<td>0.015</td>
<td>0.02</td>
</tr>
<tr>
<td>1023 or less</td>
<td>0.015</td>
<td>0.02</td>
<td>0.025</td>
</tr>
<tr>
<td>1517 or less</td>
<td>0.020</td>
<td>0.025</td>
<td>0.035</td>
</tr>
<tr>
<td>Over 1517</td>
<td>0.025</td>
<td>0.03</td>
<td>0.045</td>
</tr>
</tbody>
</table>

* This table shows the relationship between body area and degree of flatness when square or circular adsorption plates are manufactured at the recommended thickness.

Made to Order
**Caution on Design**

1. **Workpieces not able to be fixed in place by suction**
   - Workpieces of a smaller size than the adsorption surface
   - Warped workpieces
   - Workpieces with holes or porous workpieces
   - Workpieces with rough adsorption surfaces, or with vacuum leakage.

2. **Adsorption force (Theoretical fixing force)**
   \[ W = P \times S \times K (0.15) \times 0.1 \]
   - \( W \) : Adsorption force (N)
   - \( P \) : Vacuum pressure (kPa)
   - \( S \) : Adsorption surface area (cm²)
   - \( K \) : Aperture ratio 0.15 (15%)
   The adsorption force given is calculated on the assumption that 15% of the surface area of the adsorption surface is taken up by air vents. This value should be used as a guideline.

3. **Vacuum release pressure**
   After applying suction to the workpiece, when using a vacuum release to add pressure from the suction port, use a pressure of 0.1 MPa or less. Failure to do so may result in a reduction in flatness.

4. **Definitions of flatness/parallelism**
   - Flatness: The differential between the maximum and minimum values after plane correction, determined by measuring the adsorption surface side with a 3-D measuring machine.
   - Parallelism: When measuring the adsorption surface side in the same manner as with the degree of flatness, on the basis of the surface plate of the 3-D measuring machine, this is the differential between the maximum and minimum values of the datum flatness (theoretical flatness) at the point of measurement.

5. **Do not adsorb and fix the workpiece, and then try to lift it.**
   This exerts negative pressure between the workpiece and the workpiece platform, and may make adsorption impossible.
   Use in such a way that the workpiece is held in place on top of the adsorption plate.

**Operating Precautions**

1. **Connect vacuum sources such as vacuum pumps and ejectors to the suction port when using.**
   The connection port uses an Rc 1/8 taper thread for piping. Be sure to use pipe tape or sealant when connecting.

2. **The ambient temperature range should be from 10 to 40°C. Do not apply heat to the adsorption plate.**
   This may result in a reduction in flatness.

3. **When mounting to equipment, use M5 hexagon socket head bolts, and fix the adsorption plate on a surface with a high degree of flatness.**
   Mounting on a surface with a low degree of flatness may result in a reduction in flatness of the adsorption surface.

4. **Do not carry out additional processing on the adsorption plate.**
   Deformation resulting from processing may cause a reduction in flatness.

5. **This product is not compatible with clean specifications.**
   Do not use this product in a clean room.

6. **Do not apply a pressure of 0.1 MPa or more to the adsorption surface.**
   Doing so may cause a reduction in flatness, damage, or impact marks.

7. **The body is made of aluminum (casted) and the adsorption face and seating surface are untreated, meaning that discoloration or corrosion may result if it is used in an environment with water or oil splatters, or very high humidity.**
   Even when it is used indoors, discoloration may occur if used over long periods of time.

**Cleaning**

1. **If foreign particles attach to the adsorption surface, remove them by blowing with clean air.**

2. **Do not conduct immersion cleansing with solvents, etc.**
   Doing so may cause swelling and degradation of the adhesives used, and may result in a vacuum leakage or reduction in flatness.

3. **Restrict use of solvents to just wiping down with alcohol.**
   When doing so, do not use a fibrous cloth. The fabric may become stuck in the air vents and become debris.

**Storage**

1. **Store in a normal indoor environment.**
   Storing in an environment where there is splashing of water or oil, etc., may result in discoloration or corrosion.

2. **Do not place objects on top of the adsorption plate.**
   Doing so may result in a reduction in flatness.