

Vacuum Cups Overview

Only EMI gives you this wide of a selection of in-stock vacuum cup brands. Mix and match vacuum cups to best suit your application.

Check out all the alternatives! Or call our EOAT engineering department for assistance.

Piab® p.164



Excellent performing silicone.
Special dual durometer polyurethane.
Low-cost chloroprene for lower temperature, non-critical applications.

Material	Flat w/Ribs	Flat	Deep	1.5 Bellows	2.5 Bellows
Silicone	15–50mm	2–50mm	20–40mm	5–50mm	
Polyurethane	15–50mm			15–50mm	
Special PU					25–52mm
Chloroprene	15–50mm	4–50mm	15–50mm	5–40mm	

>S< Type p.196



Good quality, high performing vacuum cups in a broad size and material range.

Silicone maximum temperature 482°F.
Polyurethane max. temperature 248°F.
Viton maximum temperature 446°F.

Material	Flat w/Ribs	Flat	Deep	1.5 Bellows	2.5 Bellows
Silicone		2–95mm		10–75mm	5–90mm
Polyurethane		2–95mm		10–75mm	5–90mm
Viton		8–95mm		10–75mm	5–90mm
Nitrile		2–95mm		10–75mm	7–90mm

SMC® p.206



We make ordering SMC vacuum cups easy. See step by step ordering guide on page 207.

Good variety of alternate vacuum entries with push-in fittings and barbed fittings.

Material	Flat w/Ribs	Flat	Deep	1.5 Bellows	2.5 Bellows
Silicone	10–50mm	2–50mm	10–40mm	6–50mm	
Polyurethane	10–50mm	2–50mm	10–40mm	6–50mm	
Anti-Static		2–16mm		6–16mm	
Nitrile	10–50mm	2–50mm	10–40mm	6–50mm	

Senvex® p.224



One-nipple-size-fits-all Senvex® cups make it easy to standardize with fewer nipples, suspensions, and mounting brackets.

Nipple-integrated suspensions are also available.

Material	Flat w/Ribs	Flat	Deep	1.5 Bellows	2.5 Bellows
Silicone	10–40mm			10–40mm	
Polyurethane	10–40mm			10–40mm	
Special PU					
Nitrile					

Star® p.232



Very nice quality vacuum cups.
Two nipple sizes fit the entire range.
Nipple integrated suspensions are available.

Material	Flat w/Ribs	Flat	Deep	1.5 Bellows	2.5 Bellows
Silicone	15–20mm	6–45mm			6–40mm
Polyurethane		6–40mm			12–20mm
Fluorine		6–40mm			12–20mm
Nitrile					

Generic p.218



The translucent clear silicone cups are very nice quality.

Ideal for customers wanting non-colored silicone cups.

Popular design fits PIAB nipples.
Non-branded for OEM applications.

Material	Flat w/Ribs	Flat	Deep	1.5 Bellows	2.5 Bellows
Silicone	16–50mm	5–50mm		11–50mm	10–60mm
Polyurethane				11–50mm	10–60mm
Special PU					
Nitrile					

Apex® p.228



Long lasting, slightly thicker silicone.
One-nipple-size-fits-all.
Good quality, basic vacuum cups.

Material	Flat w/Ribs	Flat	Deep	1.5 Bellows	2.5 Bellows
Silicone	10–50mm			5–40mm	
Polyurethane					
Special PU					
Nitrile					

Vacuum Cups Overview

<p>Hithane® p.180</p> 	<p>A hybrid, high-temperature, non-silicone, non-marking cup good for use with hot plastic parts. Maximum temperature 320°F. Good flexibility.</p>	<table border="1"> <thead> <tr> <th>Material</th> <th>Flat w/Ribs</th> <th>Flat</th> <th>Oval</th> <th>1.5 Bellows</th> <th>2.5 Bellows</th> </tr> </thead> <tbody> <tr> <td>Silicone</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Polyurethane</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Hybrid</td> <td>8–50mm</td> <td></td> <td>4–75mm</td> <td>14–53mm</td> <td>7–42mm</td> </tr> <tr> <td>Nitrile</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Material	Flat w/Ribs	Flat	Oval	1.5 Bellows	2.5 Bellows	Silicone						Polyurethane						Hybrid	8–50mm		4–75mm	14–53mm	7–42mm	Nitrile					
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<p>Aclathane® p.258</p> 	<p>A special, long-life, non-marking polyurethane. Maximum temperature 212°F. Relatively stiff.</p>	<table border="1"> <thead> <tr> <th>Material</th> <th>Flat w/Ribs</th> <th>Flat</th> <th>Deep</th> <th>1.5 Bellows</th> <th>2.5 Bellows</th> </tr> </thead> <tbody> <tr> <td>Silicone</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Polyurethane</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Special PU</td> <td>6–90mm</td> <td></td> <td></td> <td>20–50mm</td> <td>20–60mm</td> </tr> <tr> <td>Nitrile</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Material	Flat w/Ribs	Flat	Deep	1.5 Bellows	2.5 Bellows	Silicone						Polyurethane						Special PU	6–90mm			20–50mm	20–60mm	Nitrile					
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<p>Gimatic® p.190</p> 	<p>Great value! Available in two styles: flat or with 1.5 bellows. Three materials: Silicone, EPDM, and Natural Rubber. Diameter from 11mm to 53mm.</p>	<table border="1"> <thead> <tr> <th>Material</th> <th>Flat w/Ribs</th> <th>Flat</th> <th>Oval</th> <th>1.5 Bellows</th> <th>2.5 Bellows</th> </tr> </thead> <tbody> <tr> <td>Silicone</td> <td></td> <td>11–53mm</td> <td></td> <td>11–53mm</td> <td></td> </tr> <tr> <td>EPDM</td> <td></td> <td>11–53mm</td> <td></td> <td>11–53mm</td> <td></td> </tr> <tr> <td>Natural Rubber</td> <td></td> <td>11–53mm</td> <td></td> <td>11–53mm</td> <td></td> </tr> <tr> <td>Nitrile</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Material	Flat w/Ribs	Flat	Oval	1.5 Bellows	2.5 Bellows	Silicone		11–53mm		11–53mm		EPDM		11–53mm		11–53mm		Natural Rubber		11–53mm		11–53mm		Nitrile					
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<p>Foam p.238</p> 	<p>Very soft, closed-cell silicone foam vacuum cups for textured surfaces. Flat 8–40mm. 1.5 bellows 20–40mm.</p>	<p>Dual Durometer p.172</p>  <p>One of the best polyurethane cups for use with EOAT. Green PU is stiffer to provide excellent part support when carrying the part vertically. Yellow PU is very flexible to provide excellent sealing.</p>																														
<p>Paper & Foil p.256</p> 	<p>Special ridges keep paper, foil, and other thin material from being sucked into the cup. Natural rubber vacuum cups 15–40mm.</p>	<p>Packaging & Paper p.255</p>  <p>DURAFLEX® mark-free material features the elasticity of rubber in combination with the wear resistance of polyurethane. High-flow fitting allows for high initial vacuum flow needed for bag handling. 30–40mm.</p>																														
<p>Hi-Speed p.254</p> 	<p>Optimized for high speed attachment and release. Great for high speed thin wall molding applications. Silicone and very flexible polyurethane materials.</p>	<p>Oval p.240</p>  <p>From 5x15mm to 25x75mm. Translucent silicone, red silicone, polyurethane. Hard to find 2.5 bellows silicone.</p>																														
<p>Long Neck p.195</p> 	<p>Translucent silicone. 6–25mm. Softer durometer. Good for small parts.</p>	<p>Mini p.246</p>  <p>For those tiny parts, vacuum cups as small as Ø2mm. Flat, 1.5 bellows, and 2.5 bellows.</p>																														
<p>4.5 Bellows p.268</p> 	<p>Great for use with angled and contoured surfaces. Translucent silicone. 20–50mm.</p>	<p>Anti-Static p.208</p>  <p>Anti-Static vacuum cups are typically used in electronic, packaging, and small parts applications. These are from the SMC family of vacuum cups. Available in Flat, and 1.5 bellows up to 16mm.</p>																														

Vacuum Cup Basics



Flat cups vs. bellows cups

If the surface of the part is smooth and flat, a flat vacuum cup is usually the best bet. Flat cups attach and release quickly and because flat cups do not tend to bend out of shape, they hold well on vertical surfaces.

If the surface is textured, curved or angled, a bellows cup is usually the best choice. Bellows cups come in a variety of depths which allows them to conform to a wide range of uneven surfaces. Because bellows cups tend to bend out of shape more than flat cups, they sometimes have trouble maintaining a vacuum when gripping heavier, vertical surfaces. Construction techniques such as the ones on the right can help to overcome this problem.

Properties of different materials

Check the charts on the following pages for flexibility and shore ratings of different vacuum cup materials. The lower the shore rating, the more flexible the material. The higher the rating, the stiffer the material. Flexible cups are usually best for parts that mark easily or for textured or uneven surfaces. And because they conform to variations in the surface of the part, they tend to form a strong, leak proof, seal. Stiffer cups on the other hand are usually able to support more weight than flexible cups.

If you are looking for a long-wearing cup that does not mark, polyurethane is usually an excellent choice. However, if your application will be at higher than normal temperatures or if you are seeing a great deal of wear, a premium polyurethane such as Aclathane® will usually provide much longer service.

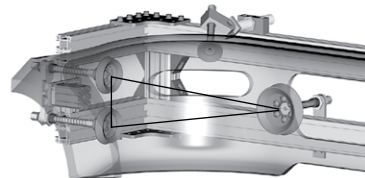
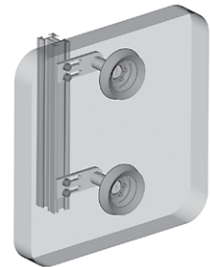
Silicone, while an excellent choice for high temperature applications, tends to leave a footprint that paint will not stick to. If parts are going to be painted, be sure to choose a non-silicone alternative such as polyurethane, Hithane, or ACLA-PU.

Using vacuum cups to grip the part

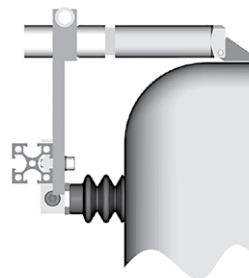
In most EOAT applications, using a vacuum cup to grip the part is usually the most efficient as well as the least costly gripping option. Vacuum cups are relatively inexpensive, dependable, easy to replace and do not normally require a separate part verification sensor.

Using Bellows Cups with Large or Heavy Parts

- 1 Position the vacuum cups vertically instead of side by side. This keeps part from rotating downward on the vacuum cups.

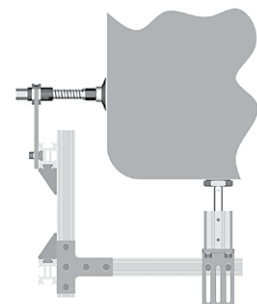


- 2 Position cups in a tripod arrangement.



- 3 Use a gripper finger to draw the part closer to the EOAT. This reduces the shear force on the vacuum cup to maintain a good vacuum seal and reduces flexing while in transport.

- 4 Position an air cylinder below the part to support it.



Vacuum Cup Basics

Temperature

Choosing the correct vacuum cup for the temperature of the part can be crucial to the longevity of the cup. Silicone is an excellent low-cost choice, but it can sometimes mark parts. Viton and Hithane are long-lasting, temperature resistant and they do not mark. Polyurethane is best saved for medium temperature applications.

When considering temperature, remember that the maximum temperatures listed in the chart refer to sustained temperatures. Because most applications do not require cups to hold a hot part for long periods of time, the maximum temperature that a cup can be used for can usually be more than that stated in the chart; i.e. a cup that is listed with a maximum temperature of 200° can often be used to grip a part of more than 200° as long as it is for a short period of time.

Making the final choice

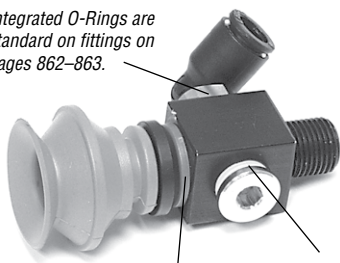
When it comes to choosing the best vacuum cup for an application, there are plenty of formulas, and pages of technical data available to help you make your choices. However, in the real world, there is basically no substitute for testing. We recommend consulting the *Vacuum Cup Selector Guide* on the previous page to help you make your choice and then testing until you are sure you have the best cup for the job.

Initial Cost vs. Long Term Cost

As vacuum cups wear, they crack and begin to leak, often resulting in dropped parts, interrupted cycles and increased maintenance costs. The loss of production, labor costs and replacement vacuum cup costs easily far exceed the initial savings of using cheap vacuum cups. Using more durable, long-wearing cups such as PIAB® Dual Durometer or ACLA-PU may cost more initially, but often costs far less in the long run.

Vacuum cup mounting tips

Integrated O-Rings are standard on fittings on pages 862–863.

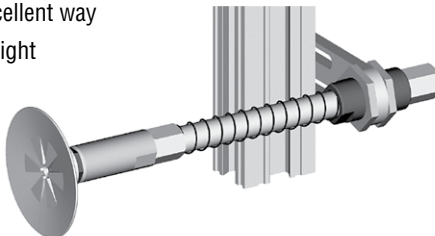


Sealing ring is fitted between nipple and block.

Always use sealing rings between threaded connections to reduce vacuum loss. Push-to-connect fittings on page 863–867 have integrated O-rings.

Integrated sealing rings on select fittings on pages 880–881.

Spring-loaded suspensions are an excellent way to compensate for variations in the height of the part. To save on cost and weight, a rigid extension can often be combined with a spring-loaded extension to extend its reach.



- 1 To reduce the chances of vacuum leakage, be sure to use sealing rings on all threaded, fitting connections.
- 2 To achieve maximum vacuum, use tubing that is large enough to allow unrestricted air flow to the vacuum cup.
- 3 To provide the fastest attach / release times, keep vacuum lines between the vacuum generator and the vacuum cup as short as possible.
- 4 If vacuum cups are leaking at the base of the pad, try using an electrical tie to stop the leakage.
- 5 To prevent oval cups from rotating out of position when gripping long, narrow parts, be sure to use non-rotating suspensions.