

Mark-free Vacuum Pad

New

For applications where adsorption marks must not be left on work pieces.

Application Examples

Transferring glass substrates

- Solar cell manufacturing equipment
- Semiconductor manufacturing equipment
- FPD manufacturing equipment, etc.



Condition Workpiece: Glass Vacuum pressure: -40 kPa



Mark-free pad
ZP2-□: Halogenated NBR pad

No trace on the object



Standard pad
ZP20CS (Silicone material)

Clear trace of the pad

Solutions

Select from 4 solutions to suit your application.

1

Halogenated NBR Pad

Halogenated NBR pad minimises the transfer of rubber constituents.

2

Stuck Fluororesin Pad

Prevents the transfer of rubber constituents from the pad by sticking a fluororesin sheet to the adsorption surface.

3

Resin Attachment

Prevents the transfer of rubber constituents from the pad by fitting PEEK or conductive PEEK material attachments to the pad.

4

Cyclone Pad

Non-contact adsorption achieved by a layer of air between the adsorption surface and the workpiece.

Features

Series ZP2



CAT.EUS100-89A-UK

Mark-free Pad Series

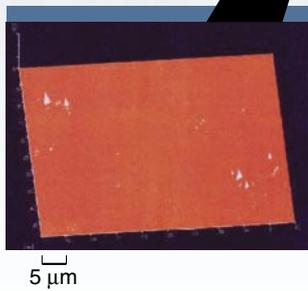
Minimises the transfer of rubber constituents to the workpiece.

Analysis equipment:
Scanning probe microscope

Measurement conditions:
Measurement mode
Atomic force microscope DFM mode

Sample conditions:
Press the vacuum pad to the Si board for 1 hour.

Monitoring location:
Monitored at a randomly selected location where adsorption marks were likely due to contact between the vacuum pad and Si board.



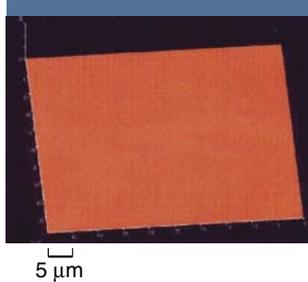
1 Halogenated NBR Pad

Minimises the transfer of rubber constituents which is supposed to be the cause of adsorption.

Pad diameter: $\varnothing 4$ to $\varnothing 125$



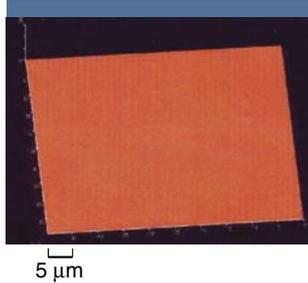
Heavy duty type



2 Stuck Fluoresin Pad

Fluoresin sheet is baked onto the pad adsorption surface. Prevents the transfer of rubber constituents.

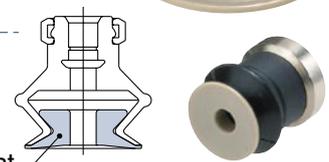
Pad diameter: $\varnothing 40$ to $\varnothing 125$



3 Resin Attachment

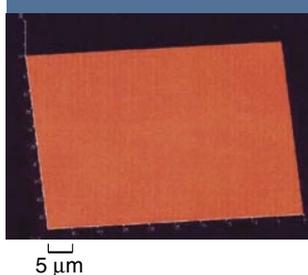
PEEK material is used for the pad adsorption surface. Prevents the transfer of rubber constituents.

Pad diameter: $\varnothing 6$ to $\varnothing 32$



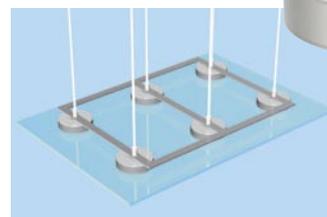
Attachment

Related Pad



4 Cyclone Pad *Made to Order*

No adsorption mark is left because the vacuum pad does not come into contact with the workpiece.



The above adsorption marks show sample data. Actual results will depend on the conditions.

Pad type	Material of the adsorption part (Part in contact with the workpiece)	Adsorption mark *1			Static friction ratio *5	
		Condition *2 (Initial value)		Operating temperature range (°C)		
		Visual checking	Vapour method *3			
Halogenated products	 Halogenated NBR pad *4 	Halogenated NBR	●	●	5 to 40	0.6
	 Stuck fluororesin pad 	NBR + Stuck fluororesin	●	●	5 to 60	0.2
		Fluororubber + Stuck fluororesin	●	●	5 to 100	
	 Resin attachment  	PEEK	●	●	5 to 40	0.2
		Conductive PEEK (Volume resistivity: $1 \times 10^6 \Omega\text{cm}$)	●	●		
 Cyclone pad <i>Made to Order</i> 	—	●	●	Standard: -5 to 60 (No freezing)	—	
Standard	Series ZP (Standard material) 	NBR Fluororubber Conductive NBR/Silicone rubber	×	×	—	—
		Silicone rubber Urethane rubber	○	×		

Adsorption mark characteristics [●: Little or no influence ○: Can be used depending on the conditions. ×: Not suitable]

* The above table is for reference when selecting the pad.

Values and evaluation are reference data only. Preparatory testing under actual operating conditions is recommended.

*1 **Adsorption mark** ——— Indicates the transfer of rubber constituents from the pad.

*2 **Condition** ——— Visual evaluation of the adsorption mark

*3 **Vapor method** ——— Method of applying vapour to the workpiece to visually check for adsorption marks

*4 **Halogenated** ——— Treatment to improve the rubber surface properties.
Reduces the friction coefficient of the rubber using the rubber's reaction with double bonds.

*5 **Static friction ratio** ——— Static friction ratio when the workpiece (glass) is adsorbed by the pad. (NBR = 1 as a benchmark)
When the cyclone pad is used, the pad does not come into contact with the workpiece (glass).
The customer needs to install a guide for holding.

Cleaning method [Halogenated NBR pad / Stuck fluororesin pad / Resin attachment]

• Always clean the product before operation and when carrying out regular maintenance.

1) Hold the part other than the adsorption surface.

* Non particle-generating vinyl gloves are recommended.

2) Soak a non particle-generating cloth in 2-propanol (isopropyl alcohol) (purity > 99.5%).

* This solution is a recommendation. If not available, use a **solution with high purity which does not affect the material properties.**

3) Wipe the adsorption surface (pad/resin attachment) and the part that comes into contact with the workpiece.

4) Dry them with clean air blow. (Or, wipe again with a dry non particle-generating cloth.)



Mark-free Pad

Symbol/Type

Pad diameter $\varnothing 4, \varnothing 6, \varnothing 8, \varnothing 10, \varnothing 16, \varnothing 25, \varnothing 32, \varnothing 40, \varnothing 50$

U: Flat

- Pad which reduces the adsorption marks left on the workpiece by rubber
- The pad is made from mark-free NBR, and the NBR is then halogenated to minimise the transfer of rubber constituents to the workpiece.
- Applicable for the ZP series adapter



How to Order

Pad unit **ZP2 - 04 UCL**

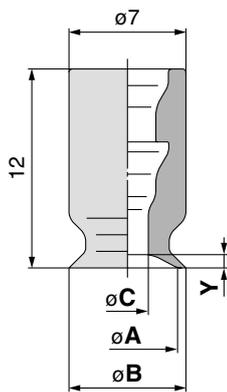
Symbol	Pad diameter
04	$\varnothing 4$
06	$\varnothing 6$
08	$\varnothing 8$
10	$\varnothing 10$
16	$\varnothing 16$
25	$\varnothing 25$
32	$\varnothing 32$
40	$\varnothing 40$
50	$\varnothing 50$

Pad type	
Symbol	Type
U	Flat

Pad material	
Symbol	Material
CL	Halogenated NBR

Dimensions/Pad Body

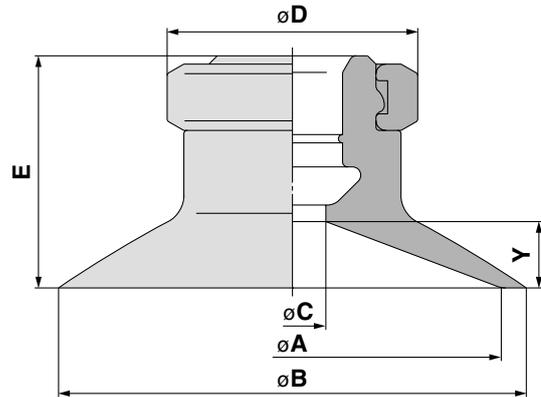
ZP2-04 to 08UCL



Dimensions

Model	A	B	C	Y
ZP2-04UCL	4	4.8	1.6	0.8
ZP2-06UCL	6	7	2.5	0.8
ZP2-08UCL	8	9	2.5	1

ZP2-10 to 50UCL



Dimensions

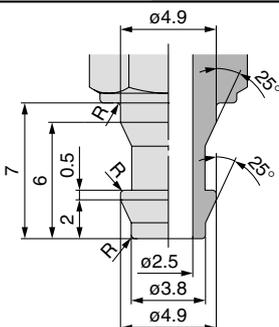
Model	A	B	C	D	E	Y
ZP2-10UCL	10	12		13	12	3
ZP2-16UCL	16	18	4		12.5	3.5
ZP2-25UCL	25	28		15	14	4
ZP2-32UCL	32	35			14.5	4.5
ZP2-40UCL	40	43	7	18	18.5	6.5
ZP2-50UCL	50	53			19.5	7.5

Adapter Mounting Dimensions

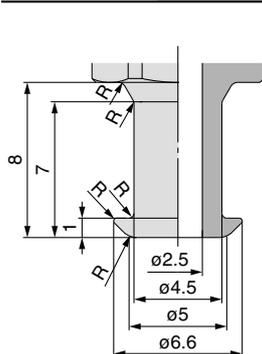
Refer to the Best Pneumatics No. 4 for the ZP series applicable adapters.

If an adapter will be made by the customer, design the adapter with the dimensions shown below.

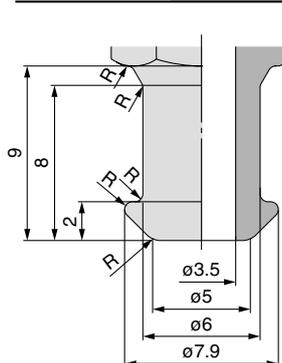
Applicable pad diameter $\varnothing 4, \varnothing 6, \varnothing 8$



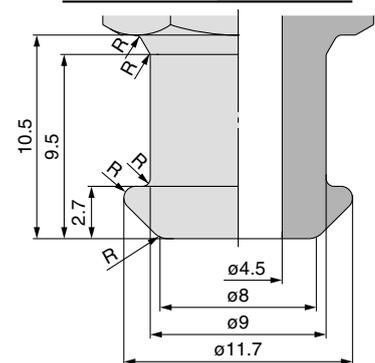
Applicable pad diameter $\varnothing 10, \varnothing 16$



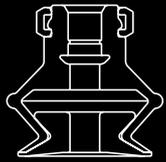
Applicable pad diameter $\varnothing 25, \varnothing 32$



Applicable pad diameter $\varnothing 40, \varnothing 50$



Note) R part has to be smooth with no corners.



Resin Attachment

Pad diameter \rightarrow $\phi 6, \phi 8, \phi 10, \phi 13, \phi 16, \phi 20, \phi 25, \phi 32$

■ No adsorption marks (rubber constituents) are left on the workpiece.

Avoids direct contact between the workpiece and the rubber by installing a PEEK attachment to the bellow pad to prevent the transfer of rubber constituents.

■ Prevents sticking of the pad (rubber) and the workpiece.

■ Ideal for the ZP series bellow pad ($\phi 6$ to $\phi 32$)



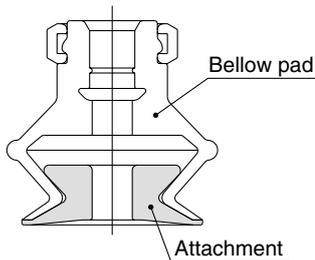
How to Order

ZP2-06K P

Pad diameter	
Symbol	Applicable pad
06	ZP06B□
08	ZP08B□
10	ZP10B□
13	ZP13B□
16	ZP16B□
20	ZP20B□
25	ZP25B□
32	ZP32B□

Attachment material	
Symbol	Material
P	PEEK
GP	Conductive PEEK

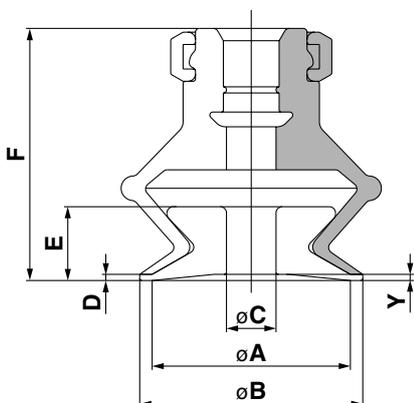
How to Order (When ordering with a pad)



- This attachment can only be assembled onto SMC's standard bellow pad.
- When the attachment is made of conductive PEEK, use conductive material for the pad.

Ordering example	ZPT06BNJ10-B5-A8	← Bellow pad part no.
	ZP2-06KP	← Resin attachment part no.

Dimensions



Dimensions

Model	Applicable pad	A	B	C	D	E	F	Y
ZP2-06K■	ZP06B□	6	7	1.6		3	13.5	
ZP2-08K■	ZP08B□	8	9	3				
ZP2-10K■	ZP10B□	10	12	3.5	0.5	3.5	16.5	0.5
ZP2-13K■	ZP13B□	13	15	4		5.5	19	
ZP2-16K■	ZP16B□	16	18			6	20.5	
ZP2-20K■	ZP20B□	20	22	8		8.5	24.5	
ZP2-25K■	ZP25B□	25	27	10	1		25	1
ZP2-32K■	ZP32B□	32	34			11.5	30	

Note 1) ■ in the table indicates the attachment material.
 Note 2) □ in the table indicates the pad material.

« Precautions »

Clean the product before using the attachment.

This product is not cleaned after machining. If the product is used in the condition in which it is shipped, residual material may be left on the work pieces. Clean before usage. If you have any questions, please contact SMC.

- If contact with hard material is a problem, do not use this product.
- PEEK material and cut parts fall under the security trade control.

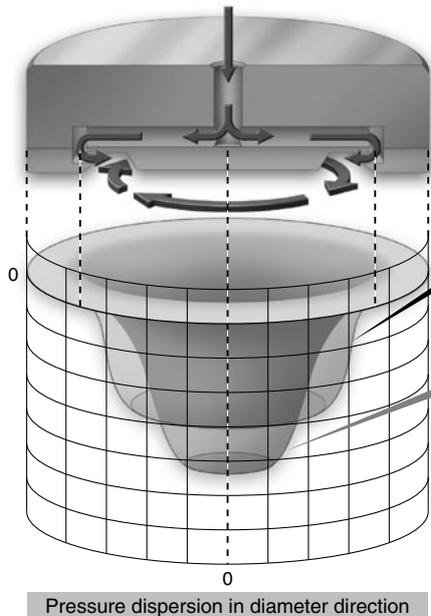
Related Pad

Cyclone Pad Made to Order

◎ Assists non-contact transfer of work pieces.

(Supply pressure: 0.4 MPa)

Outer body diameter (mm)	20	40	60	80	100
Lifting force (N)	3	11	19	27	35



◎ Original groove-channel design* provides a cyclone effect with **larger suction area** and a **more even pressure dispersion!**

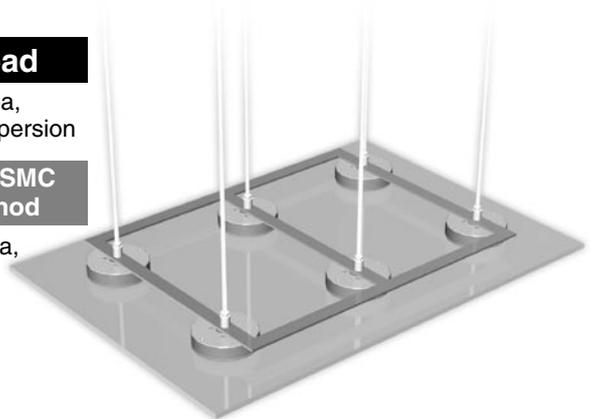
* PAT.

Cyclone pad

Large vacuum area,
even pressure dispersion

Conventional SMC cyclone method

Small vacuum area,
higher-vacuum in
the central part

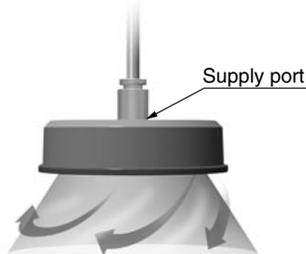


Working Principle

Nozzle

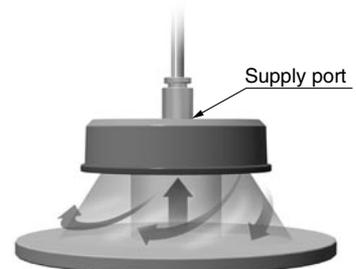


Supply port



Air from the supply port is ejected from a nozzle on the cylindrical side to generate a whirlwind airflow inside the cylinder.

Supply port



A whirlwind airflow is discharged to the atmosphere from between the cyclone pad and the workpiece. As a result, a vacuum area is generated in the whirlwind airflow by the cyclone effect, resulting in the workpiece being lifted without contact.



Refer to P-E07-8 pamphlet for details.

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1, and other safety regulations.

-  **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
-  **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
-  **Danger:** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

- *1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
- ISO 4413: Hydraulic fluid power – General rules relating to systems.
- IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Manipulating industrial robots - Safety. etc.

Warning

- 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**
Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.
- 2. Only personnel with appropriate training should operate machinery and equipment.**
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
 1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
 2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
 3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
 1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
 2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.
 3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
 4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

- 1. The product is provided for use in manufacturing industries.**
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

*2) **Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.

SMC Corporation (Europe)

Austria	☎ +43 2262622800	www.smc.at	office@smc.at
Belgium	☎ +32 (0)33551464	www.smcpn pneumatics.be	info@smcpn pneumatics.be
Bulgaria	☎ +359 29744492	www.smc.bg	office@smc.bg
Croatia	☎ +385 13776674	www.smc.hr	office@smc.hr
Czech Republic	☎ +420 541424611	www.smc.cz	office@smc.cz
Denmark	☎ +45 70252900	www.smc.dk.com	smc@smcdk.com
Estonia	☎ +372 6510370	www.smcpn pneumatics.ee	smc@smcpn pneumatics.ee
Finland	☎ +358 207513513	www.smc.fi	smc.fi@smc.fi
France	☎ +33 (0)164761000	www.smc-france.fr	contact@smc-france.fr
Germany	☎ +49 (0)61034020	www.smc-pneumatik.de	info@smc-pneumatik.de
Greece	☎ +30 210 2717265	www.smchellas.gr	sales@smchellas.gr
Hungary	☎ +36 23511390	www.smc.hu	office@smc.hu
Ireland	☎ +353 (0)14039000	www.smcpn pneumatics.ie	sales@smcpn pneumatics.ie
Italy	☎ +39 (0)292711	www.smcitalia.it	mailbox@smcitalia.it
Latvia	☎ +371 67817700	www.smc.lv	info@smclv.lv

Lithuania	☎ +370 5 2308118	www.smclt.lt	info@smclt.lt
Netherlands	☎ +31 (0)205318888	www.smcpn pneumatics.nl	info@smcpn pneumatics.nl
Norway	☎ +47 67129020	www.smc-norge.no	post@smc-norge.no
Poland	☎ +48 222119600	www.smc.pl	office@smc.pl
Portugal	☎ +351 226166570	www.smc.eu	postpt@smc.smces.es
Romania	☎ +40 213205111	www.smcromania.ro	smcromania@smcromania.ro
Russia	☎ +7 8127185445	www.smc-pneumatik.ru	info@smc-pneumatik.ru
Slovakia	☎ +421 413213212	www.smc.sk	office@smc.sk
Slovenia	☎ +386 73885412	www.smc.si	office@smc.si
Spain	☎ +34 945184100	www.smc.eu	post@smc.smces.es
Sweden	☎ +46 (0)86031200	www.smc.nu	post@smcpn pneumatics.se
Switzerland	☎ +41 (0)523963131	www.smc.ch	info@smc.ch
Turkey	☎ +90 (0)2124440762	www.entek.com.tr	smc@entek.com.tr
UK	☎ +44 (0)845 121 5122	www.smcpn pneumatics.co.uk	sales@smcpn pneumatics.co.uk