



## FIPA Vacuum cups for the plastics industry

- > The most common application in the plastics industry is the removal of plastic parts from the injection molding machine
- > Models which are able to take optimal advantage of the available space thanks to their design are primarily used for this purpose
- > Temperature-resistant vacuum cup materials which enable the subsequent painting of the parts are preferable for use

The industry recommendations listed here represent a selection of special materials. Vacuum cups made from standard materials (NBR, NR, silicone) can be found in the SF and SB series chapters.



### HNBR vacuum cups

- > Standard material for removing hot plastic parts from an injection molding machine
- > Heat-resistant up to 160 °C
- > No silicones or other adhesive-repelling substances, enabling later painting of the products
- > Low-marking
- > Wear-resistant material

### Bellows vacuum cups, 1.5 folds - SKH-B1

- > Good adaptation to uneven product surfaces
- > Bellows compensates for height differences
- > Diameter: 5 - 43 mm

> See page 86

### Bellows vacuum cups, 2.5 folds - SKH-B2

- > Very good adaptation to uneven product surfaces
- > Large range of height and angle adjustment
- > Particularly gentle handling thanks to good cushioning
- > Diameter: 5 - 60 mm

> See page 94



### Flat vacuum cups with a short lift - SFK

- > Flat vacuum cups with a short lift for flat surfaces
- > Minimal space requirement thanks to virtually vertical suction lip
- > Great suction power thanks to the largest active vacuum suction surface possible
- > Diameter: 20 - 45 mm

> See page 70

### Oval vacuum cups - SKH-O

- > Flat vacuum cups in an oval design for the handling of narrow products
- > Narrow width enables the gripping of ribbed surfaces
- > Significantly greater suction power than round vacuum cups of equal width
- > Dimensions: 4x2 - 45x15 mm

> See page 146



## FIPA Vacuum cups for the plastics industry



### **Thermalon® vacuum cups**

- > Optimised material for less to marking
- > Heat-resistant up to 160 °C
- > No silicones or other adhesive-repelling substances, enabling later painting of the products

### **Bellows vacuum cups, 1.5 folds - SKT-B1**

- > Good adaptation to uneven product surfaces
- > Diameter: 11 - 63 mm

> See page 84

### **Bellows vacuum cups, 2.5 folds - SKT-B2**

- > Very good adaptation to uneven product surfaces
- > Large range of height and angle adjustment
- > Particularly gentle placement on product surfaces
- > Diameter: 5 - 62 mm

> See page 92



### **Oval vacuum cups - SKH-O**

- > Oval-shaped flat vacuum cups for the handling of narrow products
- > Narrow width enables the gripping of ribbed surfaces
- > Significantly greater suction power than round vacuum cups of equal width
- > Dimensions: 4x2 - 45x15 mm

> See page 144

### **Flat vacuum cups - SKT-F**

- > Flat vacuum cups with a flexible single sealing lip
- > Low internal volume saves energy
- > Diameter: 5 - 60 mm

> See page 36



### **Varioflex® bellows cups, 1.5 and 2.5 folds - SP-BX**

- > Excellent service life and superior retention force
- > Special polyurethane in two degrees of hardness (60° Shore A black, 30° Shore A red)
- > Soft lip for optimal sealing
- > Short cycle times and high process reliability
- > Operating temperature: 10 - 50 °C
- > Low-marking

#### **1.5 folds - SP-BX1**

- > Good adaptation to uneven product surfaces
- > Supports (∅ 20 - 75 mm) stabilise the product
- > Diameter: 15 - 75 mm

> See page 107



#### **2.5 folds - SP-BX2**

- > Good adaptation to uneven product surfaces
- > Large range of height and angle adjustment
- > Diameter: 15 - 75 mm

> See page 110



## Series | Bellows vacuum cups SB

High temperature HNBR bellows cups, 1.5 folds - SKH-B1

### High temperature HNBR bellows cups, 1.5 folds - SKH-B1

UP TO 160 °C &  
MINIMUM MARKING




#### Product Description

Bellows vacuum cups for uneven surfaces with suitability for removing hot plastic parts to be painted from an injection moulding machine. Connection via plug-in nipple.


#### Advantage

- > Free of silicone and other paint-wetting-impairment substances (PWIS)
- > Minimum-marking
- > Bellows compensate differences in height and enable good adaptation to curved or uneven product surfaces

#### Technical data

Item no.	Model / Lip dimensions		Number of folds	Material / Colour	Usage temperature [°C]
23.005.178._*	SKH-B1-5	2	1.5	HNBR (ge)	0 - 160
23.008.166._*	SKH-B1-8	3.5	1.5	HNBR (ge)	0 - 160
23.011.008._*	SKH-B1-11	4.5	1.5	HNBR (ge)	0 - 160
23.015.122._*	SKH-B1-15	5	1.5	HNBR (ge)	0 - 160
23.016.016._*	SKH-B1-16	6	1.5	HNBR (ge)	0 - 160
23.020.124._*	SKH-B1-20	8	1.5	HNBR (ge)	0 - 160
23.030.125._*	SKH-B1-30	9	1.5	HNBR (ge)	0 - 160
23.043.096._*	SKH-B1-43	12	1.5	HNBR (ge)	0 - 160

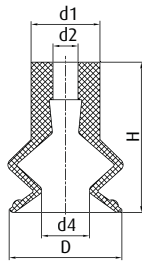
#### Accessories

Item no.	 Suitable fittings						
	M5-male	M5-female	M6-male	G1/8-male	G1/8-female	G1/4-male	G1/4-female
23.005.178._*	270.153 (p.409)	--	--	--	--	--	--
23.008.166._*	270.153 (p.409)	--	--	--	--	--	--
23.011.008._*	270.013 (p.410)	270.005 (p.412)	270.103 (p.413)	270.003 (p.416)	270.015 (p.421)	--	--
23.015.122._*	270.010 (p.411)	270.005 (p.412)	--	270.009 (p.417)	270.007 (p.422)	--	--
23.016.016._*	270.013 (p.410)	270.005 (p.412)	270.103 (p.413)	270.003 (p.416)	270.015 (p.421)	--	--
23.020.124._*	270.311 (p.411)	--	--	270.063 (p.419)	270.061 (p.422)	--	--
23.030.125._*	--	--	270.312/19 (p.414)	270.030 (p.419)	270.019 (p.423)	270.274 (p.427)	270.275 (p.432)
23.043.096._*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)

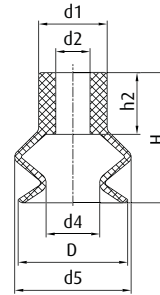
\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



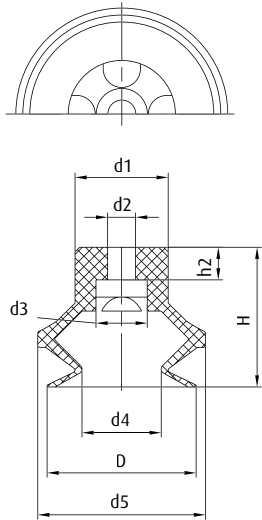
Dimensions



Drawing A



Drawing B



Drawing C

Item no.	Drawing	Ø D [mm]	Ø d1 [mm]	Ø d2 [mm]	Ø d3 [mm]	Ø d4 [mm]	Ø d5 [mm]	H [mm]	h2 [mm]
23.005.178.*	A	6	5	2	--	2.2	--	9	--
23.008.166.*	A	9	5.5	2	--	3.8	--	12	--
23.011.008.*	B	12	10	5	--	4.5	12	16	9
23.015.122.*	C	15	8.5	3.6	6	8	17	16	1.7
23.016.016.*	B	16	10	5	--	8	17	19	9
23.020.124.*	C	21.5	15	4.5	11	10	23.5	20	4.6
23.030.125.*	C	32	20	6	11	17	36	30	7
23.043.096.*	B	43	18	8	--	23	45	27	12

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Average holding forces for vacuum cups you will find on page 760



## Series | Bellows vacuum cups SB

High temperature HNBR bellows cups, 2.5 folds - SKH-B2

### High temperature HNBR bellows cups, 2.5 folds - SKH-B2

UP TO 160 °C &  
MINIMUM MARKING




#### Product Description

Bellows vacuum cups for uneven surfaces with suitability for removing hot plastic parts to be painted from an injection moulding machine. Connection via plug-in nipple.


#### Advantage

- > Free of silicone and other paint-wetting-impairment substances (PWIS)
- > Minimum-marking
- > Long vacuum cup lift and good adaptation to curved or uneven product surfaces

#### Technical data

Item no.	Model / Lip dimensions		Number of folds	Material / Colour	Usage temperature [°C]
21.005.057.*	SKH-B2-5	3	2.5	HNBR (ge)	0 - 160
21.007.089.*	SKH-B2-7	3	2.5	HNBR (ge)	0 - 160
21.009.002.*	SKH-B2-9	2	2.5	HNBR (ge)	0 - 160
21.012.135.*	SKH-B2-12	7	2.5	HNBR (ge)	0 - 160
21.014.053.*	SKH-B2-14	9	2.5	HNBR (ge)	0 - 160
21.018.010.*	SKH-B2-18	8	2.5	HNBR (ge)	0 - 160
21.020.016.*	SKH-B2-20	9	2.5	HNBR (ge)	0 - 160
21.032.075.*	SKH-B2-32	13	2.5	HNBR (ge)	0 - 160
21.043.049.*	SKH-B2-43	19	2.5	HNBR (ge)	0 - 160
21.060.051.*	SKH-B2-60	25	2.5	HNBR (ge)	0 - 160

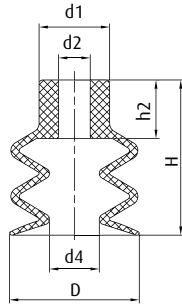
#### Accessories

Item no.	 Suitable fittings						
	M5-male	M5-female	M6-male	G1/8-male	G1/8-female	G1/4-male	G1/4-female
21.005.057.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.007.089.*	270.010 (p.411)	270.005 (p.412)	--	270.009 (p.417)	270.007 (p.422)	--	--
21.009.002.*	270.013 (p.410)	270.005 (p.412)	270.103 (p.413)	270.003 (p.416)	270.015 (p.421)	--	--
21.012.135.*	270.013 (p.410)	270.005 (p.412)	270.103 (p.413)	270.003 (p.416)	270.015 (p.421)	--	--
21.014.053.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.018.010.*	270.013 (p.410)	270.005 (p.412)	270.103 (p.413)	270.003 (p.416)	270.015 (p.421)	--	--
21.020.016.*	270.013 (p.410)	270.005 (p.412)	270.103 (p.413)	270.003 (p.416)	270.015 (p.421)	270.194 (p.425)	--
21.032.075.*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)
21.043.049.*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)
21.060.051.*	--	--	270.315 (p.414)	--	--	270.540 (p.429)	270.539 (p.434)

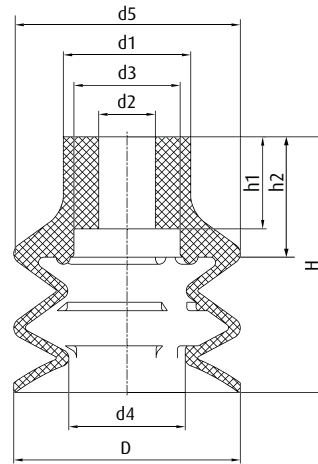
\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



### Dimensions



Drawing A



Drawing B

Item no.	Drawing	Ø D [mm]	Ø d1 [mm]	Ø d2 [mm]	Ø d3 [mm]	Ø d4 [mm]	Ø d5 [mm]	H [mm]	h1 [mm]	h2 [mm]
21.005.057.*	A	5.5	7	4	--	2.5	--	14	--	8.5
21.007.089.*	B	7	7.5	4	5.5	3	7	10	2	3.5
21.009.002.*	A	9	9	5	--	4	--	15	--	7
21.012.135.*	A	12	10	5	--	5	--	21	--	9
21.014.053.*	A	14	8	4	--	5.5	--	18	--	5.5
21.018.010.*	A	18	10	4.5	--	7	--	22	--	8.5
21.020.016.*	A	20	10	4.5	--	10	--	23	--	9
21.032.075.*	B	32	18	8	15	16.5	32	36	13	17
21.043.049.*	B	42	20	8	15	15.5	42	46	13	17
21.060.051.*	B	61	22	8	14	28	61	57	14	18.5

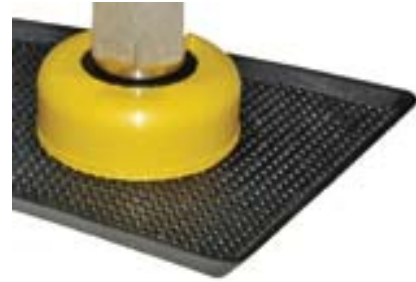
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## Series | Flat vacuum cups SF

Flat vacuum cups with a short lift - SFK

### Flat vacuum cups with a short lift - SFK






#### Product Description

Flat vacuum cups with a minimum lift for flat surfaces. HNBR version especially suited for removing hot plastic parts from an injection moulding machine, as they are silicone-free and temperature-resistant up to 160 °C.  
SFK-G series particularly suitable for clamping elements. Connection via a form-locking, snap-in aluminium plate.


#### Advantage

- > Great suction power thanks to the largest active vacuum suction surface possible
- > Minimised wear, as the suction lip does not slide over the product during suction
- > Low space requirement
- > Cost-effective replacement of worn seals

#### Technical data

Item no.	Model / Lip dimensions		Material / Colour
	<b>SFK-K</b>		
102.020.458._*	SFK-K-20	0.5	HNBR (ge), NR (br)
102.030.459._*	SFK-K-30	0.8	HNBR (ge), NR (br)
102.045.460._*	SFK-K-45	1.2	HNBR (ge), NR (br)
	<b>SFK-G</b>		
154.065.003._*	SFK-G-65	3	NBR (sw), SI (w), NR (sw)
154.110.014._*	SFK-G-110	1.5	NBR (sw), SI (w)
154.150.021._*	SFK-G-150	2	NBR (sw), SI (w)

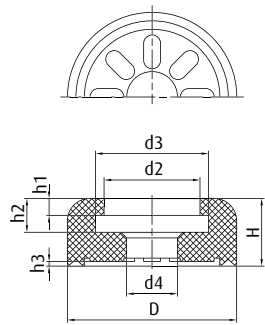
#### Accessories

Item no.	 Suitable fittings				
	M5-male	G1/8-female	G1/4-female	G3/8-female	G1/2-female
<b>SFK-K</b>					
102.020.458._*	270.521 (p.412)	--	--	--	--
102.030.459._*	--	270.234 (p.438)	--	--	--
102.045.460._*	--	270.235 (p.438)	--	--	--
<b>SFK-G</b>					
154.065.003._*	--	270.158 (p.438)	270.264 (p.438)	270.161 (p.438)	270.286 (p.438)
154.110.014._*	--	--	270.224 (p.438)	270.167 (p.438)	270.266 (p.438)
154.150.021._*	--	--	270.171 (p.438)	270.173 (p.438)	270.268 (p.438)

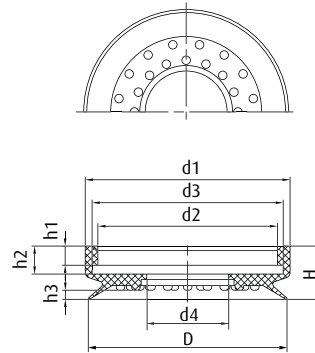
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Average holding forces for vacuum cups you will find on page 760



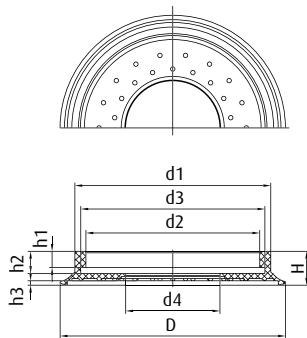
### Dimensions



**Drawing A**



**Drawing B**



**Drawing C**

Item no.	Drawing	Ø D [mm]	Ø d1 [mm]	Ø d2 [mm]	Ø d3 [mm]	Ø d4 [mm]	H [mm]	h1 [mm]	h2 [mm]	h3 [mm]
<b>SFK-K</b>										
102.020.458._*	A	20	20	10	14	6.5	12	3	7	0.5
102.030.459._*	A	30	30	17	20	9	12	3	6	0.8
102.045.460._*	A	45	45	25	28	9	12	3.5	5.5	1.2
<b>SFK-G</b>										
154.065.003._*	B	65	67	59	63	27	17.5	6.3	9	3
154.110.014._*	C	114	96	88	91	53	17	8	11	1.2
154.150.021._*	C	153	133	118	125	64	23	11	15	3

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Average holding forces for vacuum cups you will find on page 760





## Series | Oval vacuum cups SO

High temperature-resistant HNBR oval cups - SKH-O

### High temperature-resistant HNBR oval cups - SKH-O

UP TO 160 °C & MINIMUM MARKING



#### Product Description

Oval vacuum cups for smooth surfaces suitable for removing hot plastic parts to be painted from an injection moulding machine. Connection via plug-in nipple.

#### Advantage

- > Free of silicone and other paint-wetting-impairment substances (PWIS)
- > Minimum-marking
- > Significantly increased suction force compared to round vacuum cups of the same width
- > Soft sealing lip also allows adhesion to curved products

#### Ordering notes:

From size 15x5 mm upward, a gripper clamp (available separately) is recommended to prevent inadvertent rotation

#### Technical data

Item no.	Model / Lip dimensions	Lip height	Material / Colour	Usage temperature [°C]	Accessories
132.4x2.031._*	SKH-O-4x2A	0.5	HNBR (ge)	0 - 160	Clamp --
132.7x4.034._*	SKH-O-7x4	0.8	HNBR (ge)	0 - 160	Clamp --
132.15x5.067._*	SKH-O-15x5	1	HNBR (ge)	0 - 160	78.030 (p.476)
132.24x8.066._*	SKH-O-24x8	1	HNBR (ge)	0 - 160	78.032 (p.476)
132.36x12.068._*	SKH-O-36x12	2	HNBR (ge)	0 - 160	78.032 (p.476)
132.45x15.064._*	SKH-O-45x15	3	HNBR (ge)	0 - 160	78.033 (p.476)

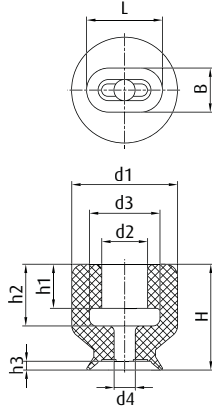
#### Accessories

Item no.	Suitable fittings					
	M3-male	M4-male	M5-male	G1/8-male	G1/4-male	G1/4-female
132.4x2.031._*	270.014 (p.408)	270.111 (p.408)	270.300 (p.411)	--	--	--
132.7x4.034._*	270.014 (p.408)	270.111 (p.408)	270.300 (p.411)	--	--	--
132.15x5.067._*	--	--	--	270.431 (p.418)	--	--
132.24x8.066._*	--	--	--	270.431 (p.418)	--	--
132.36x12.068._*	--	--	--	270.431 (p.418)	--	--
132.45x15.064._*	--	--	--	--	270.097 (p.426)	270.098 (p.432)

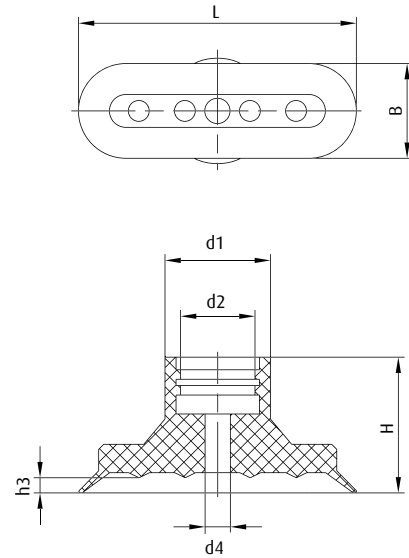
\* When ordering please add the appropriate material code to item no. You will find it in the foldout. Average holding forces for vacuum cups you will find on page 760



Dimensions



Drawing A



Drawing B

Item no.	Drawing	L [mm]	B [mm]	Ø d1 [mm]	Ø d2 [mm]	Ø d3 [mm]	Ø d4 [mm]	H [mm]	h1 [mm]	h2 [mm]	h3 [mm]
132.4x2.031._*	A	4.3	2.5	6	2.6	4	1.2	6	2.5	3.5	0.5
132.7x4.034._*	A	7.5	4	6	2.4	3	1.4	6	2.3	3	0.7
132.15x5.067._*	B	15	5	9	5	--	2	12	--	--	0.8
132.24x8.066._*	B	24	8.5	12.5	5	--	3	13	--	--	1.5
132.36X12.068._*	B	36	12	12	5	--	4	12	--	--	1.6
132.45x15.064._*	B	44	15	16.5	12	--	4	22	--	--	2.4

\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



## Series | Bellows vacuum cups SB

High temperature Thermalon® bellows cups, 1.5 folds - SKT-B1

### High temperature Thermalon® bellows cups, 1.5 folds - SKT-B1

UP TO 160 °C & MINIMUM MARKING




#### Product Description

Bellows vacuum cups for uneven surfaces especially suited for removing hot plastic parts to be painted from an injection moulding machine. Thermalon® is a material mixture specially optimised for the plastics industry with a hardness of 60° Shore A. Connection via plug-in nipple.


#### Advantage

- > Extremely low-marking
- > Free of silicone and other paint-wetting-impairment substances (PWIS)
- > Bellows compensate differences in height and enable good adaptation to curved or uneven product surfaces

#### Technical data

Item no.	Model / Lip dimensions		Number of folds	Material / Colour	Usage temperature [°C]
23.011.234.*	SKT-B1-11	5.5	1.5	Thermalon® (bl)	0 - 160
23.014.235.*	SKT-B1-14	5	1.5	Thermalon® (bl)	0 - 160
23.016.236.*	SKT-B1-16	8.5	1.5	Thermalon® (bl)	0 - 160
23.018.237.*	SKT-B1-18	5	1.5	Thermalon® (bl)	0 - 160
23.020.238.*	SKT-B1-20	5	1.5	Thermalon® (bl)	0 - 160
23.022.239.*	SKT-B1-22	8	1.5	Thermalon® (bl)	0 - 160
23.025.240.*	SKT-B1-25	12	1.5	Thermalon® (bl)	0 - 160
23.033.241.*	SKT-B1-33	11	1.5	Thermalon® (bl)	0 - 160
23.043.242.*	SKT-B1-43	12.5	1.5	Thermalon® (bl)	0 - 160
23.053.243.*	SKT-B1-53	15	1.5	Thermalon® (bl)	0 - 160
23.063.244.*	SKT-B1-63	15	1.5	Thermalon® (bl)	0 - 160

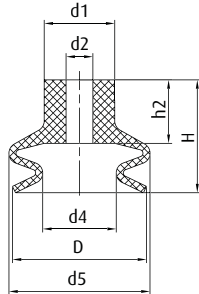
#### Accessories

Item no.	 Suitable fittings						
	M5-male	M5-female	M6-male	G1/8-male	G1/8-female	G1/4-male	G1/4-female
23.011.234.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
23.014.235.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
23.016.236.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
23.018.237.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
23.020.238.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
23.022.239.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
23.025.240.*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
23.033.241.*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)
23.043.242.*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)
23.053.243.*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)
23.063.244.*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)

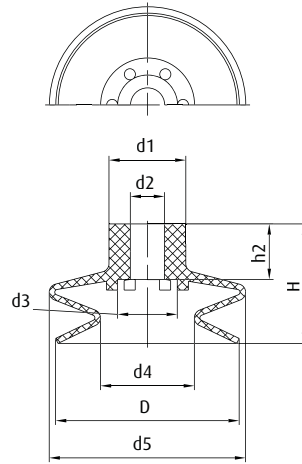
\* When ordering please add the appropriate material code to item no. You will find it in the foldout. Average holding forces for vacuum cups you will find on page 760



## Dimensions



Drawing A



Drawing B

Item no.	Drawing	Ø D [mm]	Ø d1 [mm]	Ø d2 [mm]	Ø d3 [mm]	Ø d4 [mm]	Ø d5 [mm]	H [mm]	h2 [mm]
23.011.234.*	A	11	10	3.8	--	5	12	16	9
23.014.235.*	A	13	10	3.8	--	5	14	16	9
23.016.236.*	A	16	10	3.8	--	8	17.5	19	9
23.018.237.*	A	18	10	3.8	--	8	18	16.5	9
23.020.238.*	A	19	10	3.8	--	10.5	20	16	9
23.022.239.*	A	22	10	3.8	--	11	24	19	9
23.025.240.*	A	24	10	3.8	--	9.5	25	23	9
23.033.241.*	B	33	18	8	14	17	36	28	13
23.043.242.*	B	43	18	8	14	22	46	28	13
23.053.243.*	B	53	18	8	14	33	59	34	13
23.063.244.*	B	63	18	8	14	44	67	34	13

\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



## Series | Bellows vacuum cups SB

High temperature Thermalon® bellows cups, 2.5 folds - SKT-B2

### High temperature Thermalon® bellows cups, 2.5 folds - SKT-B2

UP TO 160 °C & MINIMUM MARKING




#### Product Description

Bellows vacuum cups for uneven surfaces especially suited for removing hot plastic parts to be painted from an injection moulding machine. Thermalon® is a material mixture specially optimised for the plastics industry with a hardness of 60° Shore A. Connection via plug-in nipple.


#### Advantage

- > Extremely low-marking
- > Free of silicone and other paint-wetting-impairment substances (PWIS)
- > Long vacuum cup lift and good adaptation to curved or uneven product surfaces

#### Technical data

Item no.	Model / Lip dimensions		Material / Colour	Number of folds	Usage temperature [°C]
21.005.146._*	SKT-B2-5	3	Thermalon® (bl)	2.5	0 - 160
21.007.147._*	SKT-B2-7	3	Thermalon® (bl)	2.5	0 - 160
21.009.148._*	SKT-B2-9	3	Thermalon® (bl)	2.5	0 - 160
21.012.149._*	SKT-B2-12	7	Thermalon® (bl)	2.5	0 - 160
21.014.150._*	SKT-B2-14	10	Thermalon® (bl)	2.5	0 - 160
21.018.151._*	SKT-B2-18	10	Thermalon® (bl)	2.5	0 - 160
21.020.152._*	SKT-B2-20	10	Thermalon® (bl)	2.5	0 - 160
21.025.153._*	SKT-B2-25	20	Thermalon® (bl)	2.5	0 - 160
21.032.154._*	SKT-B2-32	14.5	Thermalon® (bl)	2.5	0 - 160
21.042.155._*	SKT-B2-42	22	Thermalon® (bl)	2.5	0 - 160
21.052.156._*	SKT-B2-52	27	Thermalon® (bl)	2.5	0 - 160
21.062.157._*	SKT-B2-62	31	Thermalon® (bl)	2.5	0 - 160

#### Accessories

Item no.	 Suitable fittings						
	M5-male	M5-female	M6-male	G1/8-male	G1/8-female	G1/4-male	G1/4-female
21.005.146._*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.007.147._*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.009.148._*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.012.149._*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.014.150._*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.018.151._*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.020.152._*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.025.153._*	270.134 (p.409)	270.347 (p.412)	270.104 (p.413)	270.033 (p.416)	270.478 (p.421)	--	--
21.032.154._*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)
21.042.155._*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)

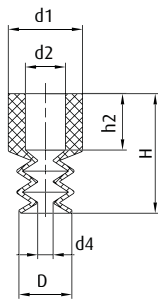
\* When ordering please add the appropriate material code to item no. You will find it in the foldout. Average holding forces for vacuum cups you will find on page 760



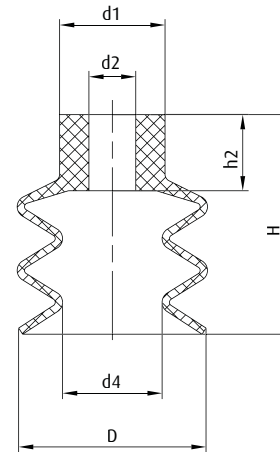
### Accessories

Item no.	Suitable fittings						
	M5-male	M5-female	M6-male	G1/8-male	G1/8-female	G1/4-male	G1/4-female
21.052.156.*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)
21.062.157.*	--	--	270.315 (p.414)	270.196 (p.420)	270.114 (p.422)	270.190 (p.428)	270.192 (p.432)

### Dimensions



Drawing A



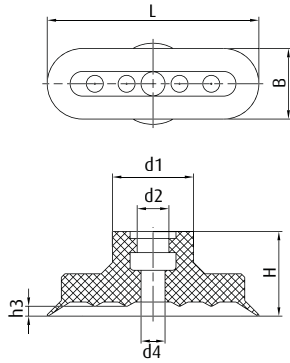
Drawing B

Item no.	Drawing	Ø D [mm]	Ø d1 [mm]	Ø d2 [mm]	Ø d4 [mm]	H [mm]	h2 [mm]
21.005.146.*	A	5.5	7	4	2.2	13.5	8
21.007.147.*	A	6	8.5	4.5	1.8	14	6.5
21.009.148.*	A	9.5	9	4.4	4	15	7.5
21.012.149.*	B	12	10	3.8	5	21	9
21.014.150.*	B	14	10	3.8	5	23	9
21.018.151.*	B	17.5	10	3.8	7.5	23	9
21.020.152.*	B	20	10	3.8	10	23	9
21.025.153.*	B	25	10	3.8	10	34	9
21.032.154.*	B	32	18	8	17	38	13
21.042.155.*	B	42	18	8	18.5	46	13
21.052.156.*	B	52	18	8	25	49	13
21.062.157.*	B	62	21	8	30	55	13

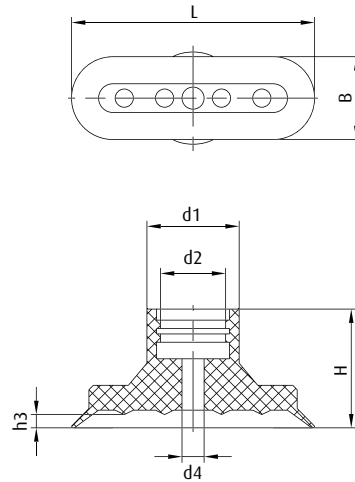
\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



### Dimensions



Drawing C



Drawing D

Item no.	Drawing	L [mm]	B [mm]	Ø d1 [mm]	Ø d2 [mm]	Ø d3 [mm]	Ø d4 [mm]	H [mm]	h1 [mm]	h2 [mm]	h3 [mm]
132.4x2.001.*	A	5	2.7	2	1	--	--	3	--	1.3	0.5
132.4x2.031.*	B	4.3	2.5	6	2.6	4	1.2	6	2.5	3.5	0.5
132.7x4.002.*	A	7.5	3.8	3.5	1.5	--	--	4.5	--	1.9	0.8
132.7x4.034.*	B	7.5	4	6	2.4	3	1.4	6	2.3	3	0.7
132.12x4.004.*	B	12	4	8	4	--	1.5	15	--	9.5	1
132.15x5.008.*	C	15	5	9	5	--	2	12	--	--	0.8
132.18x6.012.*	C	18	6	9	4.5	--	2	12	--	--	1.3
132.24x8.016.*	C	24	8	11.5	4.5	--	3	12	--	--	1.3
132.30x10.018.*	C	30	10	11.5	4.5	--	3.4	12	--	--	1.4
132.36x12.019.*	C	36	12	12	5	--	4	12	--	--	1.2
132.45x15.020.*	D	44	15	16.5	12	--	4	22	--	--	2.4
132.60x20.022.*	D	60	20	16.5	11.5	--	4	22	--	--	2.2
132.75x25.023.*	D	75	25	17.5	11	--	3.5	22	--	--	3
132.100x35.26.*	D	100	35	17.5	11.5	--	8	22	--	--	3.1

\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



## Series | Oval vacuum cups SO

High temperature-resistant Thermalon® oval cups - SKT-O

### High temperature-resistant Thermalon® oval cups - SKT-O

UP TO 160 °C & MINIMUM MARKING



#### Product Description

Oval vacuum cups for smooth surfaces suitable for removing hot plastic parts to be painted from an injection moulding machine. Thermalon® is a material mixture specially optimised for the plastics industry with a hardness of 60° Shore A. Connection via plug-in nipple.

#### Advantage

- > Extremely low-marking
- > Free of silicone and other paint-wetting-impairment substances (PWIS)
- > Significantly increased suction force compared to round vacuum cups of the same width
- > Soft sealing lip also allows adhesion to curved products

#### Ordering notes:

From size 24x8 mm upward, a gripper clamp (available separately) is recommended to prevent inadvertent rotation.

#### Technical data

Item no.	Model / Lip dimensions	Lip thickness	Material / Colour	Usage temperature [°C]
132.4x2.079._*	SKT-O-4x2	0.4	Thermalon® (bl)	0 - 160
132.7x4.080._*	SKT-O-7x4	0.5	Thermalon® (bl)	0 - 160
132.15x5.081._*	SKT-O-15x5	0.6	Thermalon® (bl)	0 - 160
132.18x6.082._*	SKT-O-18x6	1	Thermalon® (bl)	0 - 160
132.24x8.083._*	SKT-O-24x8	1	Thermalon® (bl)	0 - 160
132.30x10.084._*	SKT-O-30x10	1	Thermalon® (bl)	0 - 160
132.45x15.085._*	SKT-O-45x15	2	Thermalon® (bl)	0 - 160
132.60x20.086._*	SKT-O-60x20	2.5	Thermalon® (bl)	0 - 160
132.75x25.087._*	SKT-O-75x25	2.5	Thermalon® (bl)	0 - 160

#### Accessories

##### Clamp

--  
--  
--  
--  
78.032 (p.476)  
78.032 (p.476)  
78.033 (p.476)  
78.033 (p.476)  
78.034 (p.476)

#### Accessories

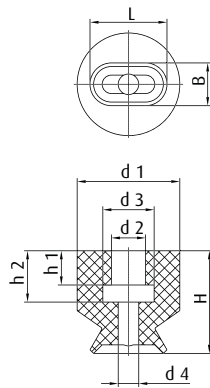
Item no.	Suitable fittings						
	M3-male	M4-male	M5-male	G1/8-male	G1/8-female	G1/4-male	G1/4-female
132.4x2.079._*	270.014 (p.408)	270.111 (p.408)	270.300 (p.411)	--	--	--	--
132.7x4.080._*	270.014 (p.408)	270.111 (p.408)	270.300 (p.411)	--	--	--	--
132.15x5.081._*	--	--	270.094 (p.411)	270.095 (p.418)	270.096 (p.422)	--	--
132.18x6.082._*	--	--	270.094 (p.411)	270.095 (p.418)	270.096 (p.422)	--	--
132.24x8.083._*	--	--	270.094 (p.411)	270.095 (p.418)	270.096 (p.422)	--	--
132.30x10.084._*	--	--	270.094 (p.411)	270.095 (p.418)	270.096 (p.422)	--	--
132.45x15.085._*	--	--	--	--	--	270.097 (p.426)	270.098 (p.432)
132.60x20.086._*	--	--	--	--	--	270.097 (p.426)	270.098 (p.432)
132.75x25.087._*	--	--	--	--	--	270.097 (p.426)	270.098 (p.432)

\* When ordering please add the appropriate material code to item no. You will find it in the foldout. Average holding forces for vacuum cups you will find on page 760

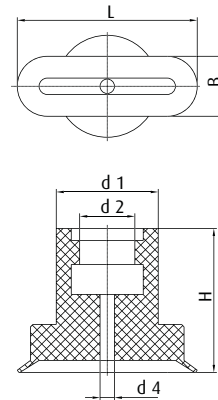




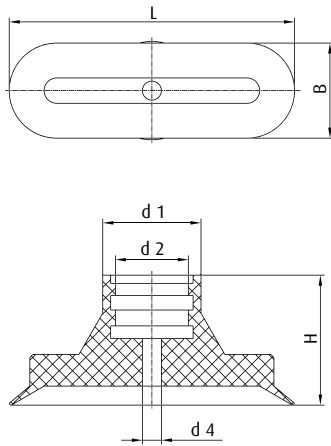
Dimensions



Drawing A



Drawing B



Drawing C

Item no.	Drawing	L [mm]	B [mm]	Ø d1 [mm]	Ø d2 [mm]	Ø d3 [mm]	Ø d4 [mm]	H [mm]
132.4x2.079._*	A	4.5	2.5	6	2	3	1.2	6
132.7x4.080._*	A	7	3.5	6	2	3	1.4	6
132.15x5.081._*	B	15	5	8.5	4.6	--	1.2	12
132.18x6.082._*	B	18	6	8.5	4.6	--	1.5	12
132.24x8.083._*	B	24	8	11.5	5.5	--	1.5	12
132.30x10.084._*	B	30	10	11.5	5.5	--	2.5	12
132.45x15.085._*	C	45	15	15.5	11.5	--	3	21
132.60x20.086._*	C	60	20	15.5	11.5	--	4	21
132.75x25.087._*	C	75	25	17.5	11.5	--	4	21

\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



## Series | Flat vacuum cups SF

High temperature Thermalon® cups - SKT-F

### High temperature Thermalon® cups - SKT-F

UP TO 160 °C & MINIMUM MARKING



#### Product Description

Flat vacuum cups for smooth surfaces especially suitable for removing hot plastic parts to be painted from an injection moulding machine. Thermalon® is a material mixture optimised for the plastics industry with a hardness of 60° Shore A. Connection up to Ø 50 mm by means of plug-in nipple, from Ø 60 mm with vulcanised carrier plate (bolttable).

#### Advantage

- > Extremely low-marking
- > Free of silicone and other paint-wetting-impairment substances (PWIS)
- > Great stability allows high acceleration

#### Technical data

Item no.	Model / Lip dimensions	Height	Material / Colour	Usage temperature [°C]
102.005.496.*	SKT-F-5	0.9	Thermalon® (bl)	0 - 160
102.008.497.*	SKT-F-8	1.3	Thermalon® (bl)	0 - 160
102.010.498.*	SKT-F-10	1.5	Thermalon® (bl)	0 - 160
102.015.499.*	SKT-F-15	1.9	Thermalon® (bl)	0 - 160
102.020.500.*	SKT-F-20	2.3	Thermalon® (bl)	0 - 160
102.025.501.*	SKT-F-25	3	Thermalon® (bl)	0 - 160
102.030.502.*	SKT-F-30	2	Thermalon® (bl)	0 - 160
102.040.503.*	SKT-F-40	3.9	Thermalon® (bl)	0 - 160
102.050.504.*	SKT-F-50	4	Thermalon® (bl)	0 - 160
102.060.505.*	SKT-F-60	4.9	Thermalon® (bl)	0 - 160

#### Accessories

Item no.	Suitable fittings							Suitable spring levelers (Snap-In)	
	M5-male	M5-female	M6-male	G1/8-male	G1/8-female	G1/4-male	G1/4-female	Spring leveler	Height
102.005.496.*	270.010 (p.411)	270.005 (p.412)	--	270.009 (p.417)	270.007 (p.422)	--	--	50.330 (p.454)	10
102.008.497.*	270.010 (p.411)	270.005 (p.412)	--	270.009 (p.417)	270.007 (p.422)	--	--	50.330 (p.454)	10
102.010.498.*	270.010 (p.411)	270.005 (p.412)	--	270.009 (p.417)	270.007 (p.422)	--	--	50.330 (p.454)	10
102.015.499.*	270.200 (p.411)	--	--	270.064 (p.418)	270.065 (p.422)	--	--	50.330 (p.454)	10
102.020.500.*	270.311 (p.411)	--	--	270.063 (p.419)	270.061 (p.422)	--	--	--	--
102.025.501.*	--	--	270.312/19 (p.414)	270.030 (p.419)	270.019 (p.423)	270.274 (p.427)	270.275 (p.432)	--	--
102.030.502.*	--	--	270.312/19 (p.414)	270.030 (p.419)	270.019 (p.423)	270.274 (p.427)	270.275 (p.432)	--	--

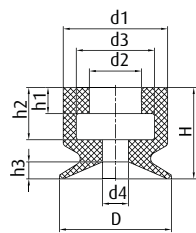
\* When ordering please add the appropriate material code to item no. You will find it in the foldout. Average holding forces for vacuum cups you will find on page 760



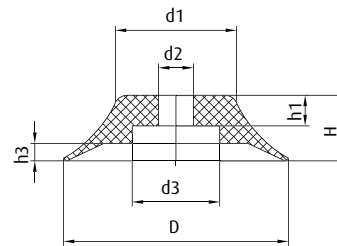
Accessories

Item no.	Suitable fittings							Suitable spring levelers (Snap-In)	
	M5-male	M5-female	M6-male	G1/8-male	G1/8-female	G1/4-male	G1/4-female	Spring leveler	
102.040.503._*	--	--	270.312/19 (p.414)	270.030 (p.419)	270.019 (p.423)	270.274 (p.427)	270.275 (p.432)	--	--
102.050.504._*	--	--	--	270.012 (p.421)	270.020 (p.423)	270.491 (p.429)	270.492 (p.434)	--	--
102.060.505._*	--	--	--	--	--	--	--	--	--

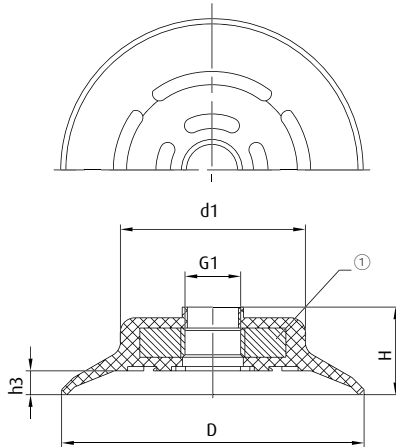
Dimensions



Drawing A



Drawing B



Drawing C

① = Aluminium

Item no.	Drawing	∅ D [mm]	∅ d1 [mm]	∅ d2 [mm]	∅ d3 [mm]	∅ d4 [mm]	G1	H [mm]	h1 [mm]	h2 [mm]	h3 [mm]
102.005.496._*	A	5.5	7.5	4	6	1.5	--	6.5	2	4	0.9
102.008.497._*	A	8.5	8	4	6	2	--	7	2	4	1.3
102.010.498._*	A	11	8.5	4	6	2	--	7.5	2	4	1.4
102.015.499._*	B	15.5	12	4.5	8	--	--	8	2.7	--	1.8
102.020.500._*	B	21	15	4.5	11	--	--	10	4.5	--	2.2
102.025.501._*	B	26	16	6	11	--	--	14	7	--	2.8
102.030.502._*	B	31	14.5	6	11	--	--	12	7	--	2
102.040.503._*	B	41	24	6	11	--	--	14	7	--	3.9
102.050.504._*	B	51	27.5	8	20	--	--	15	7	--	4
102.060.505._*	C	62	38	--	30	--	G1/4	18	--	--	5

\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



## Varioflex® bellows cups, 1.5 folds - SP-BX1

**NEW**



**COMPOSITE MATERIAL 60°/30°**

### Product Description

Bellows vacuum cups with 1.5 folds made of an extremely wear-resistant polymer.  
Soft, flexible sealing lip in 30° Shore A (red).  
Stable body in 60° Shore A (black).  
Cleats stabilise the product.

### Advantage

- > Long life cycle reduces machine downtimes
- > Perfect sealing performance on rough or uneven surface
- > High stability and fast reset
- > Oil and Ozone resistant
- > Extremely low-marking
- > Bellows compensate for height differences
- > Cleats allow for fast acceleration




### Notes:

Explanation of the type description:

- > SP-BX1 = series name of the bellows vacuum cup with 1.5 folds
- > -xx = nominal diameter
- > Example: SP-BX1-15 = bellows vacuum cup with 1.5 folds and a nominal diameter of 15 mm

### Technical data

### Accessories

Model / Lip dimensions	Ø [mm]	Connection thread 1	Item no.	Connection thread 2	Item no.	Connection thread 3	Item no.		Usage temperature [°C]	Spare cup	
	<b>Bellows vacuum cups 1.5 folds - SP-BX1 fully assembled with fitting</b>										
SP-BX1-15	16	M5-male	22.016.253.16	M6-male	22.016.254.16	--	--	4.5	10 - 50	23.016.263.16	
SP-BX1-20	21	G1/8-male	22.021.255.16	--	--	--	--	5	10 - 50	23.021.264.16	
SP-BX1-25	26	G1/8-male	22.026.256.16	--	--	--	--	5	10 - 50	23.026.265.16	
SP-BX1-35	37	G1/8-female	22.037.257.16	G1/4-male	22.037.258.16	--	--	9	10 - 50	23.037.266.16	
SP-BX1-50	53	G1/8-female	22.053.259.16	G1/4-male	22.053.260.16	G3/8-male	22.053.261.16	10	10 - 50	23.053.267.16	
SP-BX1-75	75	G3/8-male	22.075.262.16	G3/8-female	22.075.263.16	--	--	18	10 - 50	--	

Continued on the next page 

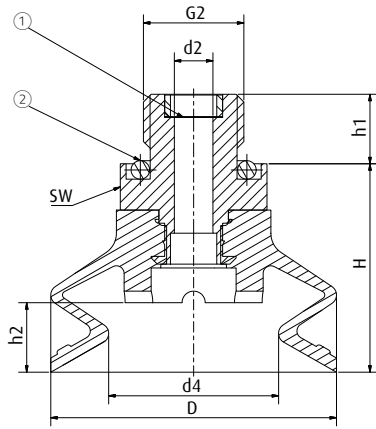
\* When ordering please add the appropriate material code to item no. You will find it in the foldout.  
Average holding forces for vacuum cups you will find on page 760



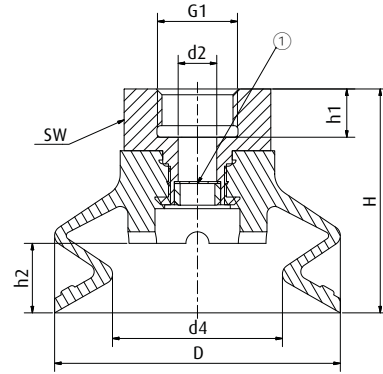
# Series | Bellows vacuum cups SB

Varioflex® bellows cups, 1.5 folds - SP-BX1

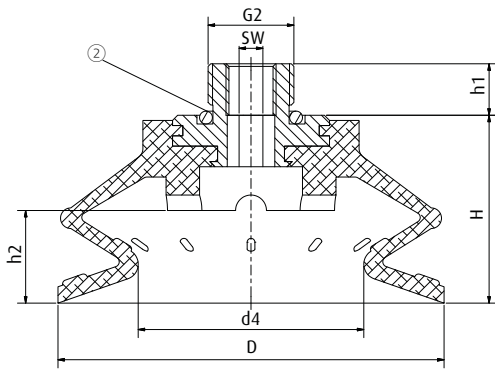
## Dimensions



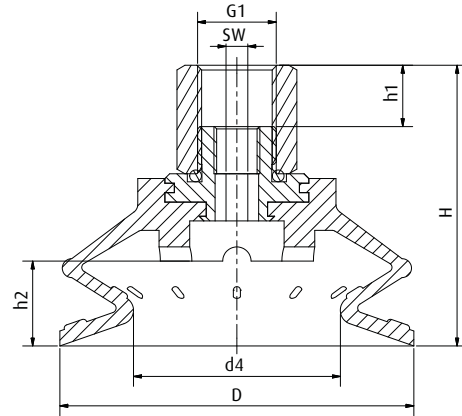
Drawing A



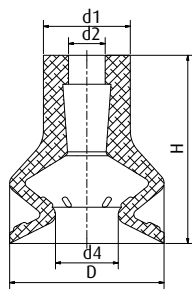
Drawing B



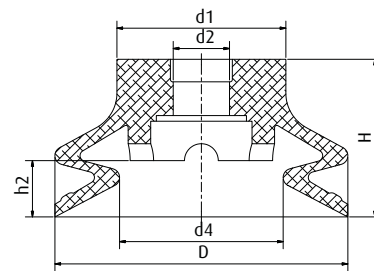
Drawing C



Drawing D



Drawing E



Drawing F

① = Filter screen ② = O-ring

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Average holding forces for vacuum cups you will find on page 760

# Series | Bellows vacuum cups SB

Varioflex® bellows cups, 1.5 folds - SP-BX1



Item no.	Drawing	∅ D [mm]	∅ d1 [mm]	∅ d2 [mm]	∅ d4 [mm]	G1 (female)	G2 (male)	H	h1 [mm]	h2 [mm]	SW
<b>Bellows vacuum cups 1.5 folds - SP-BX1 fully assembled with fitting</b>											
22.016.253.*	A	16	--	2.5	6.5	--	M5	25	3.6	--	8
22.016.254.*	A	16	--	2.5	6.5	--	M6	24	6	--	13
22.021.255.*	A	21	--	4	12	--	G1/8	19	7	5	13
22.026.256.*	A	26	--	4	14.5	--	G1/8	19	7	5	13
22.037.257.*	B	37	--	5	22	G1/8	--	29	6.3	9	19
22.037.258.*	A	37	--	5	22	--	G1/4	27	9	9	19
22.053.259.*	B	53	--	8	32.5	G1/8	--	35	9	10	22
22.053.260.*	A	53	--	6	32.5	--	G1/4	32	9	10	22
22.053.261.*	A	53	--	6	32.5	--	G3/8	32	10	10	22
22.075.262.*	C	75	--	--	44	--	G3/8	36.5	10	18	8
22.075.263.*	D	75	--	--	44	G3/8	--	55	13	18	8
<b>Spare cups</b>											
23.016.263.*	E	16	9	4	6.5	--	--	19.5	--	--	--
23.021.264.*	F	21	11	5	12	--	--	14	--	5	--
23.026.265.*	F	26	15	5	14.5	--	--	14	--	5	--
23.037.266.*	F	37	20	7	22	--	--	21	--	9	--
23.053.267.*	F	53	26	10.5	32.5	--	--	26	--	10	--

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Average holding forces for vacuum cups you will find on page 760



# Series | Bellows vacuum cups SB

Varioflex® bellows cups, 2.5 folds - SP-BX2

## Varioflex® bellows cups, 2.5 folds - SP-BX2

**NEW**



COMPOSITE MATERIAL 60°/30°



### Product Description

Bellows vacuum cups with 2.5 folds made of an extremely wear-resistant polymer.  
Soft, flexible sealing lip in 30° Shore A (red).  
Stable body in 60° Shore A (black).

### Advantage



- > Long life cycle reduces machine downtimes
- > Perfect sealing performance on rough or uneven surface
- > High stability and fast reset
- > Oil and Ozone resistant
- > Extremely low-marking
- > Excellent height and angle compensation
- > Optional: Filter disc from Ø 26 mm installed between the bellows

### Notes:

Explanation of the type description:

- > SP-BX2 = series name of the bellows vacuum cup with 2.5 folds
- > -xx = nominal diameter
- > Example: SP-BX2-15 = bellows vacuum cup with 2.5 folds and a nominal diameter of 15 mm

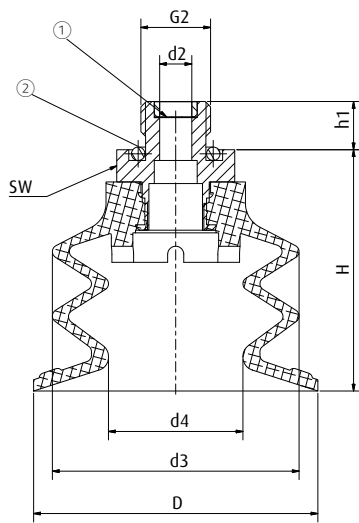
### Technical data

Model / Lip dimensions	Ø [mm]	Connection thread 1	Item no.	Connection thread 2	Item no.	Connection thread 3	Item no.	Usage temp. [°C]	Accessories
<b>Bellows vacuum cups 2.5 folds - SP-BX2 fully assembled with fitting</b>									
SP-BX2-15	16	M5-male	20.016.145.16	M6-male	20.016.146.16	--	--	5.5 10 - 50	21.016.175.16
SP-BX2-20	21	G1/8-male	20.021.147.16	--	--	--	--	6.5 10 - 50	21.021.176.16
SP-BX2-25	26	G1/8-male	20.026.148.16	--	--	--	--	8 10 - 50	21.026.177.16
SP-BX2-35	37	G1/8-female	20.037.149.16	G1/4-male	20.037.150.16	--	--	14 10 - 50	21.037.177.16
SP-BX2-50	53	G1/8-female	20.053.151.16	G1/4-male	20.053.152.16	G3/8-male	20.053.153.16	19 10 - 50	21.053.178.16
SP-BX2-75	77	G3/8-male	20.077.154.16	G3/8-female	20.077.155.16	--	--	25 10 - 50	--
<b>Bellows vacuum cups 2.5 folds - SP-BX2 fully assembled with fitting and filter</b>									
SP-BX2-25	26	G1/8-male	20.026.148.16-FI	--	--	--	--	8 10 - 50	21.026.177.16-FI
SP-BX2-35	37	G1/8-female	20.037.149.16-FI	G1/4-male	20.037.150.16-FI	--	--	14 10 - 50	21.037.177.16-FI
SP-BX2-50	53	G1/8-female	20.053.151.16-FI	G1/4-male	20.053.152.16-FI	G3/8-male	20.053.153.16-FI	19 10 - 50	21.053.178.16-FI
SP-BX2-75	77	G3/8-male	20.077.154.16-FI	G3/8-female	20.077.155.16-FI	--	--	25 10 - 50	--

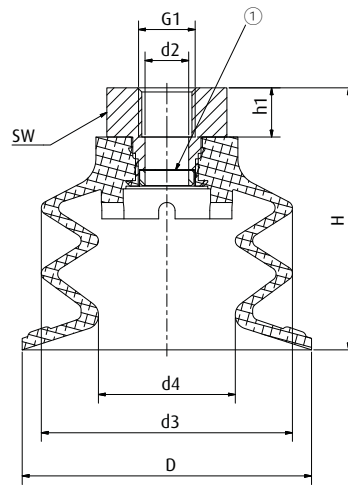
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Average holding forces for vacuum cups you will find on page 760



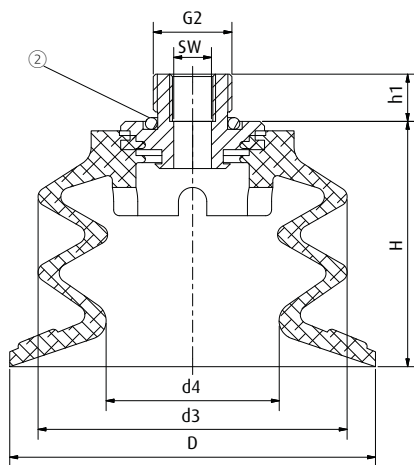
Dimensions



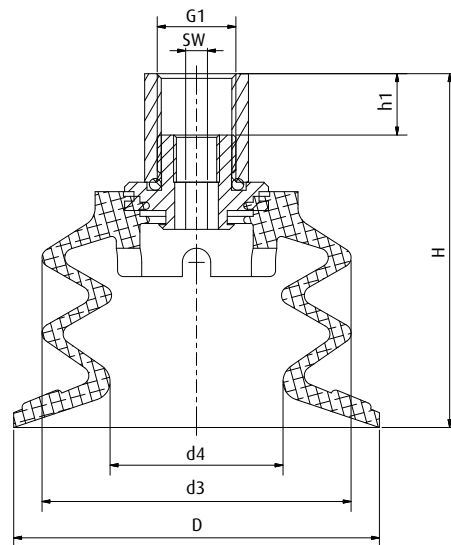
Drawing A



Drawing B



Drawing C



Drawing D

① = Filter screen ② = O-ring

Continued on the next page →

\* When ordering please add the appropriate material code to item no. You will find it in the foldout. Average holding forces for vacuum cups you will find on page 760

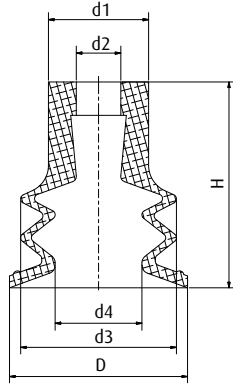




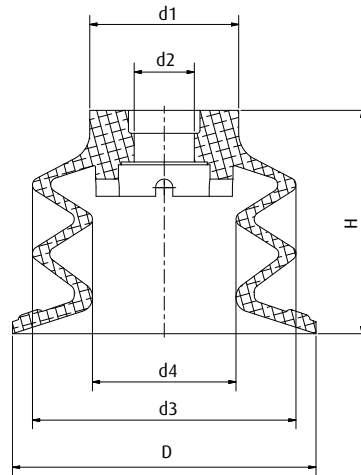
# Series | Bellows vacuum cups SB

Varioflex® bellows cups, 2.5 folds - SP-BX2

## Dimensions



Drawing E



Drawing F

① = Filter screen ② = O-ring

Item no.	Drawing	∅ D [mm]	∅ d1 [mm]	∅ d2 [mm]	∅ d3 [mm]	∅ d4 [mm]	G1 (female)	G2 (male)	H	h1 [mm]	SW
<b>Bellows vacuum cups 2.5 folds - SP-BX2 fully assembled with fitting</b>											
20.016.145.*	A	16	--	2.8	14	9	--	M5	24	4	8
20.016.146.*	A	16	--	2.5	14	9	--	M6	23	6	13
20.021.147.*	A	21	--	4	20	12	--	G1/8	20.2	7	13
20.026.148.*	A	26	--	4	23	12	--	G1/8	24	7	13
20.037.149.*	B	37	--	5	31	18	G1/8	--	34.8	6.3	19
20.037.150.*	A	37	--	5	31	18	--	G1/4	32.8	9	19
20.053.151.*	B	53	--	8	46	25	G1/8	--	48	9	22
20.053.152.*	A	53	--	6	46	25	--	G1/4	45	9	22
20.053.153.*	A	53	--	6	46	25	--	G3/8	45	10	22
20.077.154.*	C	77.5	--	--	65.5	37	--	G3/8	52	10	8
20.077.155.*	D	77.5	--	--	65.5	37	G3/8	--	75	13	8
<b>Spare cups</b>											
21.016.175.*	E	16	9	4	14	9	--	--	18.5	--	--
21.021.176.*	F	21	11	5	20	12	--	--	15.2	--	--
21.026.177.*	F	26	15	5	23	12	--	--	19	--	--
21.037.177.*	F	37	20	7	31	18	--	--	27	--	--
21.053.178.*	F	53	26	10.5	46	25	--	--	39	--	--

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Average holding forces for vacuum cups you will find on page 760