

## Vacuum clamping systems

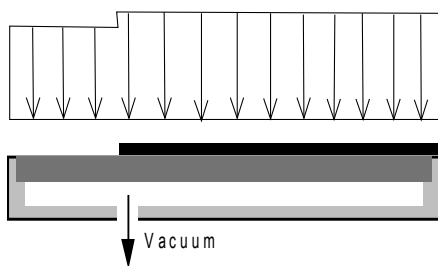
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### METAPOR® products for vacuum clamping applications

For vacuum clamping devices, different METAPOR® products are available.

METAPOR® BF100 AL is advantageous for vacuum clamping devices for fixation of sensitive materials, like very thin films (0,01 mm) or for engraving flat objects. METAPOR® CE 100 WHITE is an extremely fine porous material with a white non-reflexive surface and is easily workable. It has proven to be very useful in silicon-wafer production.

Vacuum clamping devices made from METAPOR® MC 100 AL are used for complex 3D-shapes and for complete surface coverage, to clamp parts and films without any deformation.



**METAPOR® offers new possibilities as a result of its easy machining properties. A constant decompression within the material allows a strong holding force, even when the clamping surface is partially covered. METAPOR® vacuum clamping device permits holding of parts without deformation. Since there are no drill holes or channels, even sensitive parts show no deformation. Static jam while ejecting can be**

**eliminated using compressed air, which creates a smooth and even air cushion.**

### **Advantages**

- No pore closure after machining
- Economical construction; no drill - holes needed whatsoever
- Deformation-free fixing due to micro-porous surface

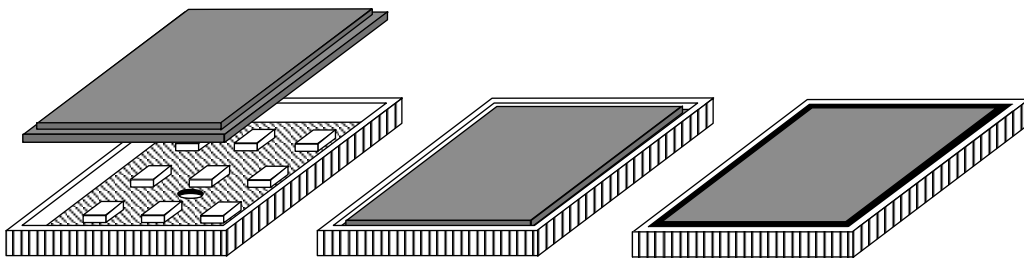
### **Applications**

- Plane clamping worktables, printing tables, measuring tables, clamping inserts within compression or injection moulds
- Profile clamping vacuum supported form grippers for complex tools, trimming of thermoformed parts, ultrasonic-cutting of slush-skins e.g. for instrument panels in the automotive industry

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Product	Applications	Density (g/cm <sup>3</sup> )	Flexural strength (N/mm <sup>2</sup> )	Air consumption in liter/min. applying 1 bar pressure difference per cm <sup>2</sup> – by using a 10 mm plate
BF 100 AL	Plane clamping	1.8	56	1.4
CE 100 WHITE	Plane clamping	1.7	28.5	1.4
MC 100 AL	Plane and profile clamping – 3D	1.7	25	11.5

### Design of a METAPOR<sup>®</sup> vacuum clamping device



Base plate with air distribution channels

METAPOR - part inserted

Gap filled with ARALDIT 2014 – adhesive, top surface milled.

### Comparison of clamping forces:

Vacuum (bar)	Clamping holding force (N/cm <sup>2</sup> )		
	METAPOR BF 100 AL	METAPOR CE 100 WHITE	METAPOR MC 100 AL
-0.30	2.3	2.3	1.6
-0.50	3.9	3.9	2.9
-0.85	8.2	8.2	8.4

The clamping holding force values measured at –0.85 vacuum are related to the complete coverage of the clamping surface; the other values are related to the partial coverage of the clamping surface.

The vacuum levels are measured in the vacuum chamber underneath the clamping device (air distribution channels). The clamping holding forces have been measured by pulling a suction cup in rectangular direction.

The tests have been made on clamping devices, each 300 x 210 mm, with a METAPOR<sup>®</sup> material thickness of 10 mm.

## **Vacuum clamping systems**

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The air has been evacuated with an ejector pump, model M200, manufactured by PIAB.