[Cups General description]

Cups are vacuum accessories which are essential where there is a problem to lift or to manipulate things, plates of other bodies, "difficult to grip" with traditional holding systems, because they have no grips or they are breakable or because they can easily be deformed. When cups are correctly applied, they can assure simplicity, economy, safety, which are the essential conditions for a perfect carrying out of any automation.
Our cups are manufactured by compression under vacuum and they can be supplied in different compounds, the most common being:

OIL-RESISTANT RUBBER

It is an excellent compound with 60 Shore hardness, resistant to oils, greases, hydrocarbons and gases; besides the above chemical-physical features, this compound also has very good mechanical properties which make it suitable to support hard works such as tearings, bucklings, strokes etc. It is able to withstand maximum temperatures of 60÷70°C.

NATURAL PARA RUBBER

Compound with 45 Shore hardness. Compared to the oil-resistant rubber, it is extremely flexible, for this reason it is suitable to solve difficult grip problems like irregular shapes or surfaces. Chemical-physical properties are not as good as the ones of the oil-resistant rubber as for example, this cannot be used in contact with oils or greases but, compared to this, it has much better mechanical features.
It can withstand, without alterations, maximum temperatures of 50÷60°C.

SILICONE

Compound with 45 Shore hardness. Due to its chemical-physical properties, it can be used in contact with oils, hydrocarbons and gases, like the oil-resistant rubber; due to its excellent flexibility, it can be used to handle loads with irregular shapes or surfaces, like the natural para rubber; due to its high heat resistance, it is used in contact with surfaces having temperatures up to 250°C. Compared to the previously described compounds, silicone rubber has a poor mechanical resistance.

SPECIAL COMPOUNDS

Upon request cups can be supplied in ANTISTATIC, NON-MARKING, EPDM, VITON, POLYURETHANE and VULKOLLAN compounds as well as in special compounds able to withstand any kind of fluid and temperatures up to 400°C.

We would like to emphasise the quality of our vacuum cups. All cups produced by us have a ground lip, which assures a perfect vacuum seal also with a minimum contact and, in order to keep unaltered in the time their properties, they are subjected to a special stabilization process exclusive to us.

TECHNICAL DATA

The holding force of the cups has been calculated using the following formula:

$$\text{Force} = \frac{S \times P}{\eta}$$

Where: **S** = Surface area of the cup, expressed in sqcm
P = Force exerted by the atmospheric pressure expressed in kg/sqcm.
η = Safety Factor

SAFETY FACTOR:

Our cups have been designed to theoretically hold a load equal to three times of the value of the force shown in the tables. The stated figures have been obtained based on the following:

P = 0,75 kg/sqcm , value created by a vacuum level of –750 mbar

η = 3; safety factor, valid when the grip plane of the cups is horizontal.

For example, a cup ø 60 mm (Art. 01 60 10), which has a surface area, S, of 28,26 sqcm , will obtain the following holding force using this calculation:

$$\text{Force} = \frac{28.26 \times 0.75}{3} = \text{Kg. } 7{,}06$$

This is based upon the following conditions:
- A vacuum level of –750 mbar, equal to 0,75 kg/sqcm.
- Horizontal grip plane of the cups.
- A non-porous load and with regular grip surface.

SPECIAL CASES:

All those cases where:
- The grip plane of the cups is vertical.
- The load to be held is porous.
- The holding surface is very rough or irregular.
- The speed of handling is very high.

The value of the safety factor must be increased for each of the above conditions.
Contact our technical department for advice on non-standard lifting applications.

APPEARANCE:

Oil-resistant rubber and natural rubber is black (except the natural para rubber cups, non-aged artificially, which are dark yellow); the cups in silicone can be supplied in white, translucent or red. The cups made of special compounds are green, brown, grey, ivory or blue.