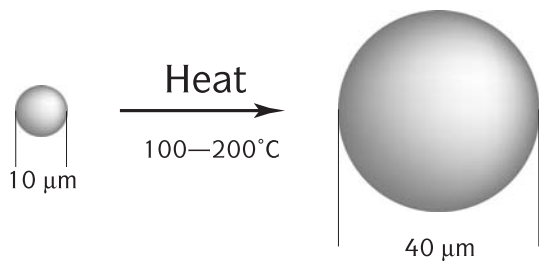


# EXPANCEL<sup>®</sup> MICROSPHERES

EXPANCEL<sup>®</sup> microspheres are small spherical plastic particles. The microspheres consist of a polymer shell encapsulating a gas. When heated the gas inside the shell increases its pressure and the thermoplastic shell softens, resulting in a dramatic increase of the volume of the microspheres.



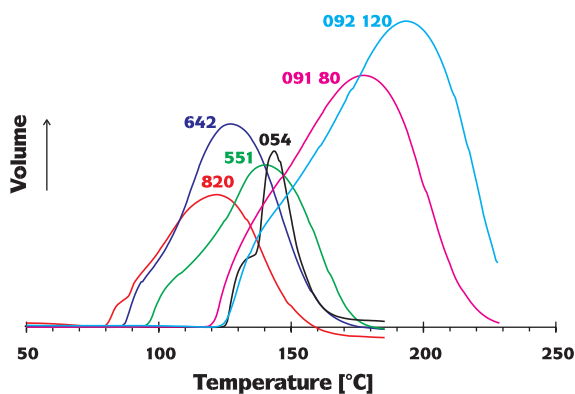
Expansion of EXPANCEL<sup>®</sup>-microsphere. This results in a dramatic decrease of the density. Typical values are from 1000 to 30 kg/m<sup>3</sup>.

## Thermomechanical properties

In the EXPANCEL<sup>®</sup> range of microspheres there are grades available with expansion temperatures in the range of 80–190°C (176–374°F).

The different thermomechanical behaviour of the various EXPANCEL<sup>®</sup> grades makes it possible to select an optimal grade for each process and application.

EXPANCEL<sup>®</sup> can normally be stored for a long time without negative effects on the properties, but very high temperatures should be avoided.

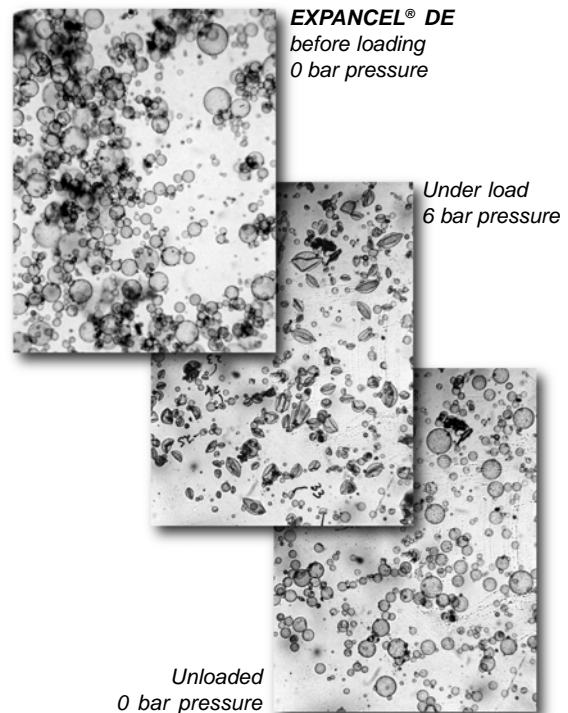


TMA-curves for some EXPANCEL<sup>®</sup>-grades.

## Elasticity

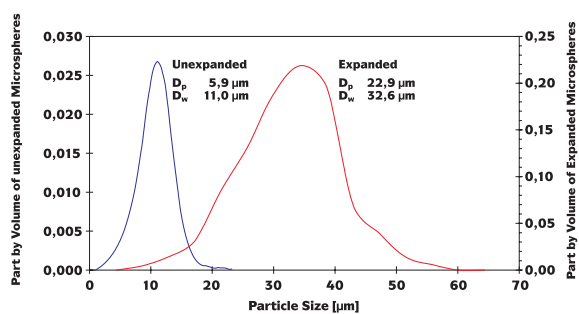
All EXPANCEL<sup>®</sup> grades are highly resilient. The expanded microspheres are easy to compress. When the pressure is released the microspheres regain their original volume.

Thanks to this resiliency the EXPANCEL<sup>®</sup> microspheres can withstand several cycles of loading/unloading without breaking. This is very important when the microspheres are used in shock absorbent materials but also when pumping the microspheres, alone or in various mixtures.



## Particle size

EXPANCEL<sup>®</sup> microspheres are delivered in different particle sizes depending on the requirements of the application. The size of the microspheres when they are expanded varies between 20 and 150 µm.



Particle size distribution for unexpanded and pre-expanded EXPANCEL<sup>®</sup> microspheres.

### **The blowing agent**

Unexpanded microspheres, **EXPANCEL® WU** and **DU**, are used as a blowing agent. When heated the microspheres reach a volume 30–50 times greater than before.

This phenomenon is used in printing ink for screen printing and gravure printing to get three-dimensional patterns on paper, wallpaper and textiles.

**EXPANCEL®** microspheres give a controlled and predictable foaming process in thermoplastics, during extrusion or injection moulding. The cell structure is one hundred percent closed with a cell size of approximately 100 microns.

Other areas of application includes underbody coatings and sealants for the automotive industry, paper and board, coating, spraying and impregnation of woven and nonwoven substrates.

### **The weight reducer**

After expansion the **EXPANCEL® WE** and **DE** microspheres have a density as low as 30 kg/m<sup>3</sup> (114 g/US gallon). This extremely low density in combination with the resilience of the **EXPANCEL®** microspheres make them outstanding in comparison with other light weight fillers in weight reduction combined with property improvement.

In cultured marble a small amount of **EXPANCEL®** microspheres (1,5 percent by weight) will reduce the weight of the products with lower risks of breakage and lower handling costs.

An addition of 1 percent by weight of microspheres to a polyester putty will reduce the density of the putty from about 1800 kg/m<sup>3</sup> to 1100 kg/m<sup>3</sup>. The sandability of the putty is also improved.

Other applications where the density is lowered by incorporating **EXPANCEL®** microspheres are polyurethane cast polymers, fine-grained spackling compounds, paints, acrylic caulks and crack fillers.

### **The property improver**

**EXPANCEL®** microspheres can improve both materials and products in many ways thus adding additional value to them.

When unexpanded microspheres are added to thermo-setting mixtures prior to their hardening surface defects, voids and hollow parts are reduced. Thanks to the expansion of the microspheres during the hardening process,

an internal pressure is maintained which results in these improvements of the surface properties.

In polyester putties the presence of pre-expanded **EXPANCEL®** microspheres gives the various formulations butterlike or creamy consistency, making them easy to apply.

The sandability of polyurethane block materials for models is improved when the material contains microspheres.

A small addition of **EXPANCEL®** microspheres to cultured marble results in a slightly more elastic material, which can stand hot/cold cycling longer.

### **Handling**

For handling **EXPANCEL® DE** there are several handling systems available to avoid dusting.



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