RUBBER

WITH EXPANDABLE MICROSPHERES

Make low density foam, with a closed cell uniform structure and great surface finish

OVERVIEW

Product Type
Unexpanded Microspheres

Main Benefits
Anti-slip effect
Closed & uniform cell structure
Elasticity
Reduced weight

Applications
Exercise mats
Extruded profiles
Extruded sheets
Floor mats
Jigsaw (martial arts) mats
Shoe soles
Transfer moulded parts
Window seals

Expandable Microspheres

Expandable microspheres are used in several rubber applications.

Examples include **extruded profiles** and **sheets** of Ethylene Propylene Diene Monomer (**EPDM**) and Nitrile Butadiene Rubber (**NBR**), and **transfer moulded parts**.

The microspheres can be **used alone**, as the only foaming agent, **or in combination** with chemical blowing agents (**CBA**).

Different microsphere **grades** are available with **different** expansion **temperatures**. It is important to match the vulcanisation twith the expansion of the microspheres, as the spheres must expand before the material is fully vulcanised.

Processing

Techniques, top tips and density reduction

Maximising Expansion

The **Tmax** of unexpanded microspheres is the temperature at which they reach their **maximum volume**.

The **maximum expansion** the spheres can reach is expected to happen at a **temperature lower** than the actual **Tmax** of pure **dry unexpanded** microspheres.

A combination of **heat transfer**, **chemical** and **mechanical exposure** to the microspheres results in the **peak temperature** for expansion being **lower** than the **Tmax**.

Using microspheres with a very **low Tmax** is likely to result in a product containing **open** and closed **cells**. This means less dimensional stability and less predictable product properties.

Expandable microspheres are available in a **range** of **particle sizes**. The **desired cell size** or **properties** can be achieved by choosing an appropriate cell size.

The microspheres contribute to a **fine** and **closed cell structure** and a **good surface texture**, ranging from matt to semi-glossy.

The **surface effect** depends on particle size of the microspheres, amount added and the processing conditions.

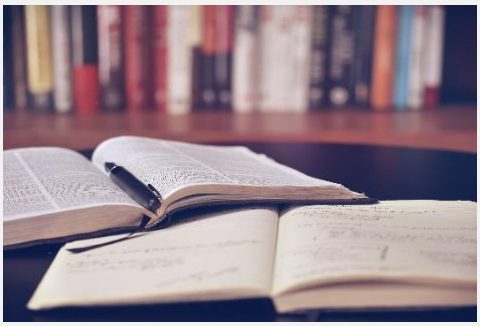
Addition levels ranging from **0.5** to **4%** are common depending on the process and the required properties of the final product.

Compression moulding, extrusion or transfer moulding are the most **suitable processing techniques** for processing rubber. Usually, injection moulding is not suitable.

Top tips:
• Add the microspheres as late as possible during mixing, together or after the curing agents
• In a mould, the added amount of rubber must be reduced to leave room enough for foaming
• **0.5** to **4%** is a suitable addition of microspheres.

Adding **1%** w/w of dry unexpanded spheres can be expected to give a **density reduction** in moulding of **30**%. A **3%** w/w addition, a **40**% density reduction, and **5%** w/w addition, a **50**% reduction.

When thinking about the **cost advantage** of using expandable spheres, it is important to consider the volume the microspheres add to the final product, where the cost of the spheres depends on the amount of expansion obtained.



What's Next?

Further Reading

Our **Technical Guide – Expandable Microspheres** takes an in depth look at the properties of expandable microspheres. A great introduction if you are new to the world of expandable microspheres.

Find out about using expandable microspheres in extrusion and injection moulding in our **Application Guide – Thermoplastics with Expandable Microspheres**.

You can also discover how expanded and unexpanded microspheres are used together in our **Application Guide – Silicone Rubber with Expandable Microspheres**.

Do you need help **choosing the right grade** for your application, **more information** or a **sample** to try?

We are always happy to help and answer any questions you may have. Please do not hesitate to contact us:

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