

MODELLING CLAY

WITH EXPANDABLE MICROSPHERES

Make lightweight modelling clay with distinctive characteristics, in larger quantities



OVERVIEW

Product Type

Expanded microspheres
Unexpanded microspheres

Main Benefits

Bounce effect
Extrudable & mouldable
Increased volume
Less shrinkage on drying
Paintable & sandable
Shape preservation
Smooth surface finish

Applications

Building & construction
Education & playing
Medical device manufacture
Sculpting

Expandable Microspheres

Expandable microspheres can be used in modelling clay to create a **lightweight** clay with **distinctive characteristics**. As the microspheres give a **large volume per weight** it is possible to decrease binder content which is normally the most expensive component of a formulation, and **reduce cost**.

For **extruded clay**, wet or dry **unexpanded** microspheres, with an average particle size of 40 µm, are recommended.

For **moulded clay**, wet or dry **expanded** microspheres with an average particle size of 40 µm and density of 0.025 g/cm³ are recommended.

Boud Minerals produce **dry expanded microspheres** in the **United Kingdom** to bring down costs, make production more environmentally friendly and improve product availability. This gives our **customers** more freedom in the choice of densities and packaging.



In the Mix

Modelling clay consists of **expandable microspheres**, binders, water, a crosslinker and additives (anti-foaming agents, dyes, fragrances, pigments, preservatives, wetting agents).

Hydroxyl-terminated polymer, polyvinyl alcohol (PVA) is the most commonly used **binder**. When using expandable microspheres, it is recommended to use a partially hydrolysed, 88 to 89%, **PVA** with a medium to high molecular weight. Carboxymethyl cellulose (**CMC**) can be used to improve **ductility** and softness. **Vinyl acetate** can be added to improve **flexibility** during modelling and maintain **shape** during drying. **Polyethylene oxide** reduces **stickiness** to improve softness and workability. Hydrolysed **silicon oil** is normally used for **bouncy** putty. For advice on the optimal **crosslinker** for your clay, contact your binder supplier.

When using **unexpanded microspheres**, mix with dispersed PVA and a portion of the crosslinker. Add to the feeder of the screw extrusion machine. In the kneader, add remaining portion of crosslinker and other additives to the extruded dough. Mix for 30 minutes.

When using **expanded microspheres**, mix with dissolved PVA. Prepare a mixture of the additives in water. Mix together until homogeneous. Slowly add the crosslinker while continuing to mix, Maintain temperature 60 to 70°C to prevent damage to the spheres, by high temperature and shear.

Troubleshooting

When the clay doesn't play the way you want



Poor Bounceability

- Dried clay too brittle
- Increase addition of cross-linker
- Increase addition of glycerol
- Increase addition of vinyl acetate
- Use PVA with lower molecular weight

Poor Elasticity of Wet Clay

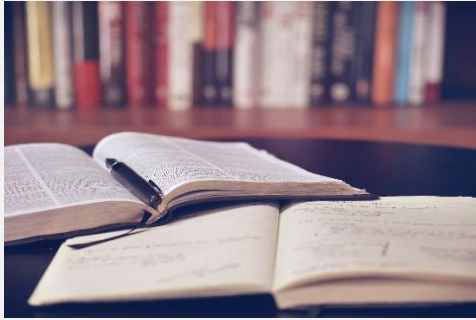
- Increase addition of crosslinker
- Increase amount of binder
- Use binder with increased number of hydroxyl groups
- Use binder with higher molecular weight
- Reduce amount of expandable microspheres

Poor Mouldability

- Decrease addition of binder(s)
- Decrease addition of crosslinker
- Decrease addition of microspheres
- Increase water content

Sticky Clay

- Add release agents
- Increase amount of crosslinker
- Increase amount of microspheres
- pH too low
- Reduce water content



Further Reading

Our **Technical Guide – Properties of 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.

Expandable microspheres have been used in lightweight putties for many years, in a variety of applications. To discover about using expandable microspheres in automotive bodyfillers, refer to our **Application Guide – Polyester Putty with Expandable Microspheres**.

For guidance on the best way to handle and mix dry expanded microspheres take a look at our **Technical Guide – Handling of Expandable Microspheres**.

What's Next?



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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Something to Note

The information contained in this guide is a result of our experience and research. It is given in good faith but under no circumstances does it constitute a guarantee on our part, nor does it hold us responsible, particularly in the case of legal action by a third party.