



# Co-efficient of Expansion Bisque & Glazes

In this guide we will explain in more detail about bisque and colour and their relative co-efficient of expansion (COE). This is the measurement which tells you at what rate a body will expand and contract. If the COE between bisque and glaze is too similar or too different, then you can experience crazing or shivering on your piece.

Think of the glaze on a piece of bisque as a suit-jacket. If the jacket is too tight, then the glaze will be under too much stress to hold itself together, and it will start to crack—this is what we call “crazing”.

If the jacket is too loose, then it won't grip hold of the piece tightly enough, and when the bisque contracts, the glaze will be left without anything to hold on to, and “shiver” off in large pieces.

## The Technical Bit

**White earthenware bisque** has a co-efficient of expansion of  $78-80 \times 10^{-7}$

Our **Colorobbia “004” Superclear Glaze** has a coefficient of expansion of  $60 \times 10^{-7}$

## Why has the glaze got a lower COE than the bisque?

Glazes can withstand far more compression than tension. This means they can be squeezed much harder than they can stand being pulled apart. For this reason, suddenly chilling a hot pottery piece is much more likely to cause the glaze to crack than suddenly heating it.

It is therefore desirable for the glaze and the body not to have an equal thermal expansion but for the thermal expansion of the glaze to be **less than that of the body**. If this is achieved, as the ware cools after firing the glaze is brought into compression by the inherently greater shrinkage of the body under it.

When you heat a piece up in the oven, for example, (and as a result of moisture expansion it swells up), the compressive force on the glaze on top is only reduced, whereas if the COE of bisque and glaze were closer, the glaze would start to pull itself apart, causing crazing.

Our Colorobbia 004 “Superclear” glaze is resistant to “thermal shock” up to around 200 degrees Celsius, which means it can be used for tableware without crazing.

## Conclusion

To avoid crazing and shivering, it is important to use high-quality bisque and reliable colour, which give great results every time. Our bisque is made from the best quality materials to ensure you have success every time you fire.

Cheap bisque may seem like a bargain when you buy it, but can cause problems when you come to fire it. By that time, you will have an unhappy customer and job to be re-done. By sourcing high-quality bisque you are safeguarding **your reputation** with your customers.

As you can see above, bisque with a COE of much less than 78 will result in crazing. Bisque with a COE higher than 85 can result in shivering.



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