

Understanding Incompatibility

Incompatibility happens when two different materials expand at different rates or become liquid at different rates. Both **COE (Coefficient of Expansion)** and **Viscosity** affect compatibility.

COE (Coefficient of Expansion) - *How much and how fast something expands.*

The higher the COE, the more the glass expands when it heats and the more it shrinks when it cools. COE 90 glass expands by a measure of 90. COE 96 glass expands by a measure of 96.

Viscosity - *How much and how fast something softens.*

Black glass absorbs heat quicker than white glass and will become soft at a lower temperature than white. If you are heating white and glass together, you must take care to heat them slowly enough the difference in viscosity doesn't cause excess incompatibility stress. Different makes of glass soften at different temperatures. The harder the glass, the more heat it needs to soften. If you try melting hard glass with soft glass, the soft glass will soften at a much lower temperature than the soft glass and cause stress. Generally, the lower the COE the harder the glass, so the lower the COE, the more heat is required to soften the glass. "Bullseye" COE 90 glass requires more heat to soften than "Spectrum" COE 96 glass. Italian COE 104 glass softens at lower temperatures than COE 90 or 96 and borosilicate COE 33 glass requires much more heat to soften than any of the softer glasses.

Incompatibility stress.

If two pieces of glass with different COE or different viscosity are heated together they won't expand at the same speed and won't soften at the same speed. This difference creates stress between the two pieces. If there's enough stress, the two pieces will separate. Sometimes they'll separate with a gentle crack and sometimes with an explosive release. It can happen during the heating process (in the kiln or in the flame) or it can happen later. It can happen a short time later or it can happen a year later. If it happens, and how long before it happens, depends on how much stress the glass is under.