

The Science of Fused Glass

Glass itself is one of the fruits of the art of fire. It is a fusion of the Earth's rocks: a mixture of sand (silicon oxide), soda (sodium oxide) and lime (calcium oxide) melted at high temperatures. Glass is an enabling material used for more than just drinking vessels and windows. It also allows scientists to observe distant stars and the smallest biological cells, and colourful chemical reactions in test tubes.

Fused glass, also called warm glass and kiln-formed glass, happens when cut pieces of art glass are fired in a kiln from 1450oF to 1600oF. The glass starts out as big sheets of art glass that we cut by hand with a glass cutter. We design each piece by combining different sizes, shapes, textures and colors of glass in two to six layers. The glass we use can be clear, coloured transparent and coloured opaque.

When a piece is all put together, it goes into our kiln on a ceramic shelf and the fusing process begins. When the glass reaches about 1350oF, you can start to see the edges of the cut glass start to soften and melt. The glass is beginning to actually flow and behaves like syrup or soft plastic and as its temperature continues to rise, you can actually see it moving in the kiln. Also at this temperature it actually becomes red hot molten glass and glows very bright. You can no longer see any colour or pattern in the glass; it is just a red glowing hot puddle of glass.

How hot the kiln gets has a lot to do with how a particular piece of fused glass looks when it's done. Some of our designs use a "tack fuse" which means the glass gets hot enough for all the cut pieces to fuse into one solid piece of glass, but the cut pieces still maintain their individual shape and texture. Other designs are fired to higher temperatures so they reach "full fuse", with the separate pieces losing their angular shape and melting into a single, smooth shape. After the glass reaches the right temperature for a particular piece, the cooling process begins. This cooling process is very slow because the whole piece of glass has to expand and contract at the same rate.