

Understanding Kiln Firing Ranges

Ultra-lowfire is the range from cone 022 (1087°F) to cone 016 (1416°F) and is used exclusively to fire metallic lusters and overglaze enamels, also called china paints. Both are applied to a previously glaze-fired surface that has been fired to a higher temperature. The reason for this is that the higher glaze-firing gives a more durable surface, while the ultra-lowfire allows the broadest possible range of brilliant enamel colors and metallic luster surface effects.

Lowfire covers from cone 014 (1485°F) to cone 02 (2014°F), and is the standard range for most bisque-firing and for glaze-firing earthenware claybodies like terracotta. Most bisque-firings range from cone 014 to cone 04. Within this range the clay is fired to a permanent porous mass that will absorb water and thus can be easily glazed. Most glazing is done by dipping, pouring, or spraying glaze on wares that have been bisque-fired to cone-08, 1728°F. After a bisque at that temperature the wares have good porosity to absorb water and thus accept a coat of glaze and reasonable strength for handling during glazing. Wares bisqued to cone 04 are far stronger, but far less porous. Cone-04 bisque is generally used only with commercial glazes that can be brushed onto a non-porous surface. Bisque-firing below cone 08 is generally only done with burnished wares or polished terra-sigillata where firing to even normal bisque temperatures will significantly diminish the shine.

Lowfire glaze-firing, generally to cone-04, offers an unlimited color palette, but the colors tend to be pretty solid and unmodulated with little visual texture, and lowfire-glazed surfaces are far more fragile than wares glaze-fired at midrange or highfire.

Low-Midrange covers the range from cone 01 (2077°F) to cone 3 (2106°F). This firing range is widely misunderstood and rarely used in studio clay. When referring to terracotta, most people think of porous, fragile, lowfired earthenware such as red-clay flower pots, but in fact low-midrange is an ideal maturing range for functional terracotta ware, and the fired pots can be as durable as stoneware or porcelain. Historically, this is also the standard firing range for outdoor architectural terracotta tile and ornamentation used in hard-freezing climates because it gives enough porosity to release the pressure of freezing moisture and enough strength to withstand that release of pressure.

Midrange covers from cone 4 (2120°F) to cone 7 (2259°F), and is the most popular firing range today, because within this range durable functional stoneware and porcelain can be fired in relatively inexpensive toploader electric kilns like the ones we use for bisque-firing. Until recently, people tended to fire and cool their electric glaze-firings too quickly, resulting in bright colors with no visual texture, very similar to lowfire glazes. That is still true of much midrange ware you see today. The book *Mastering Cone Six Glazes*, published about eight years ago by Ron Roy and John Hesselberth and colloquially referred to as **MC6G**, is revolutionizing midrange glaze firing by recommending that people slow-cool their glaze firings or initiate a soak or holding period around 1800F in order to encourage crystal-growth, producing very interesting colors and visual texture almost as lively as what can be achieved in highfiring.

Highfire is the range from cone 8 (2277°F) to cone 11 (2359°F), where most traditional stoneware and porcelain is glaze-fired, and the clay truly becomes as dense and durable as stone. In woodfiring and porcelain glaze firing the maturing temperature can occasionally be as high as cone 16 (2660°F). Note that there is only a little over a hundred degrees between cone-6 at 2232°F and cone-10 at 2345°F, but it makes all the difference. That little boost in temperature encourages far more thermochemical activity in the glaze melt and between the claybody and glaze, allowing for all sorts of surface effects not possible at lower temperatures. Think of the ceramic firing process as thermal forces of geology sped up to a microsecond in comparison to geologic time. That's why the surface effects and visual texture in highfire clays and glazes so often have the appealing nature of rocks and minerals.