

Ventilation for Electric Kilns

In contrast to “moving atmosphere” kilns, (gas, oil or wood fired kilns), which produce large amounts of carbon monoxide, electric kilns do not present a serious problem regarding ventilation. There are two aspects to address: temperature and fumes.

Temperature

The amount of heat generated in a room by a pottery kiln depends on the length of firing and temperature that the kiln is fired to. High stoneware firings, for example 1280°C will bring the outside surface of a Potclays kiln to a maximum in the region of 150°C, i.e. too hot to touch but not hot enough to cause ignition. A large kiln, say 10 or fifteen cubic feet capacity, (283litres to 425 litres) at this temperature will of course warm up a room significantly, kilns under six or seven cubic feet have much lesser impact. The size of the room is of course crucial as is movement of air through the room. Smaller kilns in a large room present no problems regarding temperature. The Health and Safety Executive make no recommendation on the number of air room changes per hour for electric kilns, indicative of the low level of problem. At Potclays we advise that there must be a constant movement of air in the room throughout the firing, and suggest as a rough guide a level of twenty air room changes per hour, though with smaller kilns this may be at a low level such as would be provided by an open window. A domestic extraction fan would suffice in conjunction with an open window or in a room without an open window. It is of course always necessary to have a source of air to replace that extracted from the room by the fan.

Fumes - General

Electric kilns, unlike gas or oil, produce no fumes, it is only the products of combustion and volatilisation from clays and glazes that may produce emissions. Harmful fumes are mostly generated at low levels, there will be traces of a variety of materials and smoke arising from combustion of carbonaceous materials. We quote from “The Electric Kiln” by Harry Fraser published by A & C Black: *“...the hazard is lowered on account of the air dilution factor of that fraction (of noxious fumes) which escapes from the kiln and it is probable that the concentration of noxious gases in an **unventilated** room will be of similar hazard to that encountered walking down a busy high street.”* Certain materials, for example ceramic transfers and lustres can

produce more harmful fumes, the manufacturers of these materials will advise on specific hazards but the volume of any toxic emissions is so small that air dilution will render them safe.

Fumes – Brush on colours and glazes.

Brush-on ceramic colours and glazes are made with organic binders that burn away in the firing, some fumes are generated at low temperatures and can give off an unpleasant smell though this passes by the time the kiln reaches around 600°C. These binders are organic compounds and will produce low levels of carbon monoxide which is easily dispersed. Brush-on materials are widely available in non-toxic form therefore there is no hazard, either in use or during the firing process; in the studio or external to the studio.

Emission Test

There have been several tests on emissions from electric kiln firings, those of Parker C Reist, Chapel Hill, North Carolina USA are typical. Emissions were tested from a 3.5 cubic foot kiln and a 7 cubic foot kiln during firings to bisque cone 04 (1070°C) and glaze cone 06 (1011°C). The kilns were located in a laboratory measuring 12 x 18 x 9ft with one open doorway. Kilns were fired in three ways: with no ventilation, with an extraction fan and with an extraction hood. Air was sampled at 1ft, above the kiln 7" to the side of the kiln, and at 5ft above the floor at a point 2ft in front of the kiln. Eighteen firings were tested, six bisque, six with a commercial glaze containing lead and cadmium and six with a commercial lithium glaze.

The threshold limited value (TLV) recommended by the American Conference of Governmental Industrial Hygienists for carbon monoxide was exceeded only in the unventilated bisque firing. TLVs were not exceeded in any other firings for any other minerals. The largest concentration of carbon monoxide was 400 ppm at the point closest to the smaller kiln three and a half hours into the firing with no ventilation. By supplying simple dilution ventilation through the fan the concentration remained below the recommended TLV.

All emissions measured remained under the TLV recommended levels; sulphur dioxide was 0.1ppm or less, formaldehyde was well below 1ppm limit at 0.59ppm at the highest. (the unventilated kiln). Without exception, metal samples, (lead, cadmium, barium, and lithium) collected from the air around the kilns during the glaze firings showed little if any present. In fact, because the fan or hood had little or no effect on metal contamination percentages, it can be

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assumed the findings represent background sources. Also, carbon monoxide levels were not as important a factor during glaze firings as compared to bisque firings, the highest concentration was 27.9ppm for the unventilated kilns.

The conclusion is drawn from this study that providing some ventilation should eliminate concentrations of hazardous elements in kiln room air.

Summary

Potclays kilns have been supplied to craft potters, schools, colleges, hospitals and many types of institutions around the world for the past eighty years; there are no recorded instances of problems relating to emissions in company records. Our accumulated experience together with studies such as the one cited above bring us to the view that an electric kiln in a reasonable sized room represents no hazard from either temperature or fumes as long as there is a movement of air through the room during firing and our guidelines as defined in the Potclays General Operating instructions are followed. We are always happy to advise on your ventilation problems and on any aspect of kiln firing and installation.

Further information

Safe use of electric kilns in craft and education. Ceramics Information Sheet no. 3 HSE.

The Electric Kiln by Harry Fraser A&C Black ISBN 0-7136-3745-5

Answers to Potters' Questions. Ceramics Monthly Magazine ISBN 0-934706-10-7

Disclaimer: Technical advice Technical information/guidance is given in good faith by representatives of Potclays Limited. Trial and error is a fundamental part of ceramic practice and there are an infinite number of variables from application to application. Any suggestions must be user-tested for suitability before full production is undertaken and we cannot accept any liability whatsoever for unsatisfactory results arising from advice given.