L&L Kilns
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KILNS BUILT TO LAST

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NOTES CONCERNING CIRCUIT PROTECTION FOR ELECTRIC KILNS

Electric kilns are resistance heating devices. The electrical circuit that provides power to the kiln must be wired in accordance with the National Electrical Code (NFPA 70, last edition is 1996) as interpreted by the local authority having jurisdiction where the kiln is located, e.g., a township building inspector. The circuit can be defined as the device (kiln) itself plus the wires (conductors) supplying power to it.

There are two common methods of protecting electrical circuits: fuses and circuit breakers. Fuses self-destruct when they sense an overload in the circuit. Circuit breakers are commonly used in new construction; they trip (turn off power) when they sense an overload, and can be reset (turned back on) when the circuit is returned to normal.

Circuit breakers are more convenient because of this feature. However, they can cause nuisance tripping and ruin kiln firings when they trip part way through a firing. This is because most circuit breakers are activated thermally; if the circuit breaker temperature rises above a preset level, a bimetallic element inside the circuit breaker opens, and the power is turned off. This works well most of the time; however, over time the bimetallic element becomes weaker because resistance heating circuits are at their rated load longer than other types of electrical loads such as motors. Eventually the circuit breaker becomes too weak to hold itself closed over a long enough time to finish a kiln firing, unless the circuit is drastically oversized to compensate for this gradual aging process.

There are **many** different types of fuses, including dual-element time delay, one-time, sub-cycle, etc. Most of these designations relate to how quickly a fuse will "blow" in response to an overload, and these types of fuses have been developed to protect not only the circuits, but also varying types of equipment. For instance, SCR's (silicon controlled rectifiers) need to be protected from voltage spikes which can occur within 1/60 of a second and destroy the device - these are usually protected by 'semiconductor' fuses which are very fast acting, current limiting, and have no time delay.

Another consideration in selecting fuses is the interrupting capacity in amperes - in other words, how big a short circuit can be opened by the fuse. In large industrial plants this can be an important factor, because if enough power is available it would be possible that a short circuit would allow too many amperes to flow into a circuit for a general purpose type fuse to interrupt - which could potentially cause an electrical fire. Most residences and small commercial shops do not have enough power available before the main circuit protector (usually a 200 amp circuit breaker) would open, and a small interrupting rating (10,000 Amps or 50,000 Amps) is enough.

For protecting kiln circuits, 'one-time' general purpose type fuses should be used. These are inexpensive, have no appreciable time delay, and are available in a large variety of sizes. They are also widely and easily available, and are made by several large fuse manufacturers. Different manufacturers have different designations for their 'one-time' fuses; some of the more common ones are:

MANUFACTURER	MAX RATED VOLTS	INTERRUPT RATING	FUSE DESIGNATION
LITTELFUSE	250 VOLTS	50,000 AMPS	NLN
BUSSMAN	250 VOLTS	50,000 AMPS	NON
GOULD SHAWMUT	250 VOLTS	50,000 AMPS	OT
LITTELFUSE	600 VOLTS	50,000 AMPS	NLS
BUSSMAN	600 VOLTS	50,000 AMPS	NOS
GOULD SHAWMUT	600 VOLTS	50,000 AMPS	OTS