During firing, materials that make up the body undergo many changes. Special care must be taken at temperatures below 1500°F (815°C) to heat the body uniformly.

Remember, the thicker the wall, the slower the heating should be done. Above 1500°F, temperatures can be increased more rapidly because the changes are less likely to cause stress cracks within the ware.

What kind of changes occur?
All clays and many minerals contain water which does not leave the body until above 700°F. Organic (carbon) materials will evolve (burn out). Minerals such as flint (silica) undergo a sudden expansion on heating to 1060°F and contraction during cooling.

How can I control my heating?
This depends on the controls for the kiln. With switches, leave them on medium settings longer. It should take more than 3 hours to reach red heat and even longer for thick pieces or a heavily loaded kiln.

Have I allowed enough time for carbon burnout?
It is important to burn out all carbon from the ware before higher temperatures are reached (1200°F or 650°C). It takes time for oxygen to move into the porous body, react with the carbon and then leave. If carbon remains, many problems can occur. These include problems with color, glaze fit, strength, blistering and discoloration. Use of a downdraft vent system, combined with slower heating, virtually eliminates carbon related problems.

Heating & cooling control
The best way to control cracking problems during firing is by controlling the rate of heating and cooling for the kiln.

What else can cause cracking?
1. Uneven heating is a primary culprit that causes cracking during firing. Hot and cold spots in the kiln can cause uneven heating of pieces. Use witness cones to diagnose hot and cold spots and then adjust the switching or use a downdraft vent to help even out the heating.
2. Underfired bisque is not as strong and may crack more easily during the glaze firing. Use witness cone to assure a proper firing and prevent underfired bisque.
3. Gas expanding in air pockets which developed in the ware during forming can cause large cracks during firing.

Want to learn more?
Read more about firing handbuilt and thickcast ware in the Orton Firing Line and Technical Tips publications. Members of the Orton Center For Firing receive these publications at no charge. Single copies are available to non-members at a per issue rate.

For information on Orton products, see your Orton dealer or distributor.

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