Clay: Shrinkage rates.

Tinderbox pipes

Richard lees, pipe maker 3/10/2008 ©

www.tinderbox.co.nz/clay_pipe_store.html

Gin pressed clay pipes will shrink as much as 25 percent from the wet state to the fired state depending upon the clay used. Not all clays have the same rate of shrinkage. Pipes pressed in the same mold - but with different clays, will be different in size when finished.

This is exhibited with two Tinder box pipes: the Pakuranga toastie clay pipe and the white earthenware clay pipe. Both were pressed in the T.Mclachlin no 18 mold. Both pipes have been through exactly the same firing process, but the white earthenware clay pipe is noticeably bigger than the Pakuranga toastie.

The T.Mclachlin no 18 mold

The Pakuranga toastie clay pipe is made from an ‘out of the ground clay,’ the white earthenware pipe is made from a ‘manufactured clay’, which has had impurities removed. Impurities like iron give the red terracotta colour on the Pakuranga toastie – the more iron in the clay the darker the colour.

Besides removing impurities to control colour, manufacturers make clay with desirable properties like stability – meaning that the pipe will not warp or crack during the making process.

Typically a clay pipe will shrink up to 5% in the drying out process.

Source: Clay and Glazes for the potter. Daniel Rhodes

Even when the drying out process is complete, a clay pipe which feels dry to the touch will contain as much to 25% ‘free water’

During the firing process the free water’ is driven off when the kiln reaches 100C, the boiling point of water. The firing must proceed very slowly through this point or the pipe will be blown apart.

At 350C the chemically combined water of the clay is driven off.

Chemically combined water is part of the molecular structure of the clay and is unaffected by temperatures below 350C

Source: Clay and Glazes for the potter. Daniel Rhodes

The firing then proceeds to maturity, somewhere between 950C and 1100C depending upon the pipe makers requirements and the type of clay.