

Vince Pitelka, 2019 – www.vincepitelka.com

The following is excerpted from my book, *Clay: A Studio Handbook*.

Controlling Atmosphere in Fuel Kilns

Of course we turn up the gas burners or stoke more wood to increase temperature in a fuel kiln, but at any point we maximize heatwork and control kiln atmosphere by adjusting the damper to regulate backpressure. An oxidizing atmosphere is easily achieved by closing the damper until you can sense backpressure at the spyholes and then opening it barely enough to eliminate all back pressure. If there is no back pressure, the kiln is oxidizing. This is rarely desirable because it means that excess cold air is entering the kiln and useable heat is escaping out the flue. Because an oxidation atmosphere is wasteful and because a reduction atmosphere can be harmful if initiated too early in the firing, it is critical that you learn sensitivity to the indicators of kiln atmosphere and how to control the atmosphere.

Determining Firing Atmosphere

NOTE: Visible flames will not appear until the kiln is well into red heat at around 1200°F. Until that happens you will need to use the first two methods, but use appropriate caution because the gasses exiting the kiln are already hot enough to burn you in any prolonged contact.

1. ***Feel for Back Pressure at the Spyhole to Ensure a Neutral Atmosphere*** – In the early stages of the firing we cannot see flames at the spyholes, and yet we need to ensure that there is no reduction because it could cause carbon-coring. Remove the top spyhole plug and wave your hand very quickly across the opening. If you feel heat coming out of the spyhole, open the damper in small increments until you feel no heat when you wave your hand in front of the spyhole. Close the damper in small increments until you feel only the slightest heat at the spyhole. That will ensure a neutral atmosphere, but also check the smell of the atmosphere as explained below.
2. ***Checking the Smell at the Spyhole to Ensure a Neutral Atmosphere*** – A reduction atmosphere has an odor that you will quickly learn to identify. As a learning exercise, next time you are firing a gas kiln in the early stages of the firing, purposefully manipulate the damper between reduction, neutral, and oxidizing just to familiarize yourself with the smells produced. Doing this briefly as a learning experience will have no negative effect on the firing. Put on a pair of heat-resistant gloves, stand off to the side of the spyhole, remove the plug, and wave a little of the gases towards your face and take a very shallow sniff. If you smell nothing, the atmosphere is oxidizing. If you detect the smell of a clean-burning gas appliance, the atmosphere is neutral. If you sense an acrid, sickeningly-sweet carbon monoxide smell, the atmosphere is reducing and you should open the damper a little at a time until the smell vanishes, but be sure to maintain slight back pressure for maximum heatwork and a neutral atmosphere.
3. ***Observing Visible Flames at the Spyholes After Red Heat*** – When the kiln is well into red heat, flames at the spyholes provide the most accurate indicator of atmosphere. If there are no flames and no back pressure the atmosphere is oxidizing. If there is a small blue or blue-orange flame at lowfire temperatures or a very small yellow or yellow-green flame at midrange or highfire temperatures, the atmosphere is neutral, which is desirable for maximum fuel economy and good heatwork but will not promote or preserve reduced effects. If there is a small yellow or yellow orange flame at the top spyhole plus a small flame at the bottom spyhole, it indicates a light or partial reduction atmosphere that is still efficient in terms of fuel consumption and heatwork but will promote or preserve reduced effects. If there are longer orange flames at both spyholes it indicates a stronger reducing atmosphere appropriate only for body reduction. Visible smoke indicates excessively heavy reduction that is wasteful and accomplishes nothing desirable.