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

Gas Burner Flames: Shape and Color

The nature and shape of a gas burner flame tells a lot about atmosphere and efficiency. No matter whether the fuel is solid, liquid, or gas, flames are still the same thing - hydrocarbon gases dissociating and combusting as they leave the initial fuel source. The release of heat causes gas particles to glow red, orange, or yellow, and we see a visible flame. The length of flame indicates the speed of combustion. The flame ends when all hydrocarbon gases have been consumed. For our purposes, variations in the color and length of gas flames will illustrate this.

- ***Short, loud blue flame*** - When too much primary air is entering a gas burner the flame will be short, noisy, and pure blue in color with no hint of orange. Such a flame is excessively oxidizing and produces little heatwork.
- ***Blue flame, tapers quickly as it enters the burner port*** - When the damper is open too far, air drawn into the kiln around the burner tip causes the flame to taper in quickly as it passes through the burner port, indicating excessive secondary air and thus inefficient heatwork.
- ***Blue flame with hints of orange expands as it enters the burner port*** - When a gas burner is adjusted for maximum fuel efficiency and the damper is set properly, the flame will be blue with flicks of orange and will expand slightly in the burner port, indicating good heatwork. This is the ideal flame for neutral and light partial reduction settings.
- ***Blue flame with hints of orange, backs up and spills slightly over external surface of burner port*** – If the burner is properly adjusted but the damper is closed quite far, back pressure may cause the flame to back up and flicker out over the outer surface of the kiln. This is a sure indicator that the kiln is reducing, and as long as the spill of flame outside the burner port is very minimal it is not a problem.
- ***Flame is orange, and a significant portion is spilling over the exterior of the burner port*** – If the damper is closed excessively, insufficient primary and secondary air will cause a very inefficient reducing orange flame. The kiln will stall and may even lose temperature.
- ***Flame is pure orange, but flows into the kiln with no spill on the outside of the burner port*** – If the damper is open sufficiently but the primary air is choked off in the burner, it will give very inefficient combustion at the source and thus produce a long, lazy, yellow/orange flame as the hydrocarbons slowly mix with oxygen along the flame path. Such a flame represents inefficient combustion, and any reduction effects will be uneven as this flame is pulled towards the exit flue, causing the effect known as ***streaming***.

What is Streaming?

Streaming happens when the damper is open too far and the heat and atmosphere are pulled from the heat source to the exhaust flue along a narrow path, producing uneven heat and reduction effects.

Always maintain correct backpressure to prevent streaming.