# Burner and Lamp Design

Whatever be your pressure or flow, the primary air to gas stoichiometric ratio is 8-10.5air:1gas. The burner opening area to the mixing tube diameter should be in the ratio of 1:1.5 - 1:2.5, depending upon the pressure drop expected, with a mixing tube length of about 10-15cm at 100-150mm water pressure. At the top, the gas-air mixtures need to be brought to the burning surface - the openings are usually 4-6mm wide for stable high temperature colourless flame. At the right air to fuel mix and achieving highest combustion temperatures (1050 Celsius) - the flame will be barely stable and will emerge about 5mm above the burner surface and will usually emit a short hissing sound. At a higher air to fuel ratio the flame head becomes unstable. Gas consumption at this stage would be about 400L/h giving an equivalence of about 2kW of thermal efficiency around 55% (heat transfer efficiency) for a flat vessel or receiving body

For mantle lamps a small deviation is suggested when working under normal gas pressure 100-150mm water pressure). First, reduce the mantle's combustion surface to one third of what is usually available for a kerosene usage. That is tie the mantle such that only a third of the area hangs down the rest is on the ceramic support above. You should now be able to support a flow of about 125L/h and yet have the mantle glowing uniformly round. If you do not reduce the combustion area (tie the mantle to allow only a third of it to glow) the glowing area will not be uniform and will keep moving around. A burner will consume a third of the gas used in conventional biogas burners - 4cft/hr (the original rating) about 125L/hr.

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