

Common Properties of Acetylene and Propane

This table provides an overview of some of the common properties of Acetylene and Propane.

Properties	Acetylene	Propane	Comments
Use for welding	Yes	No	Propane cannot be used for gas welding. Propane has enough heat to melt steel, however the flame is far too oxidising to produce sound quality welds in carbon steel.
Use for cutting	Yes	Yes	
Use for brazing	Yes	Yes	
Heat intensity (MJ/m ² /s)	61	31	Determines how effectively heat can be transferred into a work piece. An acetylene flame has nearly twice the flame intensity of propane enabling rapid heating of materials.
Calorific values (kJ/m ³)	54772	95758	The total amount of heat released by a unit weight or unit volume of a fuel gas mixture during complete combustion.
Heat Distribution (kJ/m ³)			The energy split between the primary flame (inner cone) and secondary flame (outer cone). It can be seen from the figures that acetylene has a much higher energy release in the primary cone that makes it ideal for cutting, welding and preheating operations.
1) Primary Flame	18890	10433	
2) Secondary Flame	35882	85325	
Nozzle size		Text	When using propane the operator will need to use a larger size nozzle.
Flammability limits in air (%)	2.5 to 81	2.2 to 9.5	
Maximum fill pressure (bar)	18	10	At standard temperature 15 °C.
Cylinder burst pressure (bar)	105	67	
Critical temperature (°C)	36	97	Many gases can be transformed to liquids without cooling them to their boiling point. This is done by increasing the pressure, whereby the boiling point rises. However, for each gas there is a critical temperature above which the gas cannot be transformed to a liquid no matter how high a pressure it is subjected to. The pressure that just brings about condensation at the critical temperature is called the critical pressure.
Mixing ratio with oxygen	1:1	1:4	Propane will consume more oxygen, therefore more oxygen cylinders required on site with increased manual handling.
Stability			The acetylene flame tends to be more stable and sits on the nozzle better.
			Acetylene flame temperature more concentrated therefore the flame is more controllable than propane.
			Acetylene flame is easier than the propane flame to set correctly.
Moisture content contained in combustion gases (%)	3	32	The combustion of propane and oxygen produces a fairly high level of moisture in the burnt gas compositions following combustion compared to that produced with acetylene. Depending on the application this may or may not be an issue. For example: preheating prior to welding.
Density	0.9	1.55	Acetylene is lighter than air, therefore will tend to disperse through the atmosphere. Care must be taken when working near enclosed roof spaces. Propane is heavier than air and will tend to sink and will therefore collect in any gullies, drains or low-lying voids.
Hazard in a fire	De-composition	Boiling Liquid Expansion Explosion	In a continuous fire both types of cylinder will explode due to the increase in temperature (and associated pressure).