Combustion Analyzer Formulas

CO Air Free Formula:

CO Air Free = (20.9 / (20.9 – O2 meas.)) x CO meas.

%CO2 Formula:

%CO2 = (20.9 – O2 meas.) x K2 / 20.9

Excess Air Formula:

% Excess Air = (20.9 / (20.9 – O2 meas.)) x 100

Gross Efficiency Formula:

Gross Eff. = 100% - (dry fuel losses + wet losses)

Gross Eff. = 100% - [20.9 x K1g x Tnet / K2 x (20.9 – O2 meas.)] + [K3 x (1+(0.001 x Tnet))]

Tnet = Flue Temp – Ambient Temp.

K = K values are the calorific composition of the fuel being used

Net Efficiency Formula: (Does not factor in wet losses used mainly in Europe)

Net Eff. = 100% - dry fuel losses

Net Eff. = 100% - [20.9 x K1n x Tnet / K2 x (20.9 – O2 meas.)]

Tnet = Flue Temp – Ambient Temp.

K = K values are the calorific composition of the fuel being used

Fuel Table

Fuel	K1 Gross	K1 Net	K2	K3	K4
Natural Gas	0.350	0.390	11.89	9.83	32
Light Oil	0.480	0.510	15.51	6.10	48
Heavy Oil	0.510	0.540	15.80	5.70	48
Propane	0.420	0.450	13.79	7.70	32
Bituminous Coal (Opt 1)	0.620	0.650	18.39	2.20	32
Anthracite Coal (Opt 2)	0.670	0.690	19.10	1.80	32
Coke (Opt 3)	0.750	0.760	20.61	0.30	32
Butane (Opt 4)	0.430	0.460	14.11	7.40	32
Wood (Dry) (Opt 5)	0.622	0.657	19.10	6.47	65
Bagasse (Opt 6)	0.434	0.453	20.60	19.22	65

