W1.27

Calorific Values of Fuels

Sr No

Unit of calorific value		**kcal/kg for liquid and solid fuels**
		kcal/nm^3 for gaseous fuels

Gross calorific value   Hh   Cal. Value measured in bomb calorimeter

Useful or effective value H1   steam in combustion is discharged outside the system without being utilised

A   **Theoretical formulae for Solid and Liquid fuels**

$$Hh = 8100*C + 34200*(H-O/8) + 2500*S \qquad \text{kcal/kg}$$

$$H1 = 8100*C + 29000*(H-O/8) + 2580*S - 600W \qquad \text{kcal/kg}$$
where
C=Carbon in 1kg fuel
H=Hydrogen
S=Sulphur
O=Oxygen
W=Water

B   **Practical formula**

$$Hh = 8100'*Cf + (9600-bW)*(Vm +W) \qquad \text{kcal/kg}$$
where
Cf=fixed carbon
Vm=volatiles
W=inherent moisture
b=650 if W < 0.5
b=500 if W > 0.5

C   Formulae for gaseous fuels

$$Hh = 3035*(CO)+3055*(H_2)-9530*(CH_4)+14900*(C_2H_4)$$

$$H1 = 3035*(CO)-2570*(H_2)-8570*(CH_4)+13940*(C_2H_4)$$

D   typical calorific values of different fuels

solid fuels

name	cal. Value kcal/kg
anthracite coal	7300-8000
bituminous coal	5200-7800
high ash bituminous coals	3800-4500
brown coal	4000-5500
lignite	2000-4000
coke	6200-7200
wood	2800-3500
charcoal	6700-7500

liquid fuels

benzene	11100-11500
kerosene	10300-10370
diesel oil	10160-10230
heavy oil	10020-10120

gaseous fuels cal. Value kcal/nm^3

natural gas	8400-18300
coal gas	4500-5200
coke furnace gas	7000

note : nm^3 = normal cubic metre

source : Onoda handbook