

Heat Input (HI) calculation

“How to do it”

The heat input is defined as:

$$\frac{\text{welding current [A]} \times \text{arc voltage [V]} \times 60}{\text{welding speed [cm/min]}} \quad [\text{J/cm}]$$

According EN 1011-2 is the heat input formula defined as:

$$Q = k \times \frac{I \times U}{v}$$

Thermal efficiency	
SAW	1
SMAW	0.8
GMAW	0.8
FCAW	0.8
GTAW	0.6
PAW	0.6

Where

k = relative thermal efficiency for the applicable process (see table)

U = arc voltage in V

I = welding current in A

v = welding speed in mm/s

Often the welding speed is given in cm/min.

Shielded Metal Arc Welding

In case of shielded metal arc welding (SMAW); it may be difficult to use the above formula, so you can use the data of the tables listed in EN 1011-2, in which the run out length is expressed in terms of electrode diameter and heat input, by different efficiencies and a consumed electrode length of 410 mm (when the electrode length is 450 mm).

Otherwise you can use the following formula:

$$Q = \frac{D^2 \times L \times F}{ROL}$$

Where

D = electrode diameter

L = the consumed length of the electrode (mm). Normally this is the originally length less 40 mm for the stub end

ROL = run out length

F = factor in kJ/mm³ depending on the efficiency

efficiency approx. 95% F = 0.0368

95% < efficiency ≤ 110% F = 0.0408

110% < efficiency ≤ 130% F = 0.0472

efficiency > 130% F = 0.0608