7.2 Power

All of the system energy requirements and the energy losses in the pump must be supplied by a prime mover in the form of mechanical energy. The rate of energy input needed is defined as power and is expressed in watts (W) - for practical purposes, power within this handbook is expressed in kilowatts (kW), i.e. watts x 10^3.

7.2.1 Hydraulic Power

The theoretical energy required to pump a given quantity of fluid against a given total head is known as hydraulic power, hydraulic horse power or water horse power.

This can be calculated as follows:

$$\text{Hydraulic Power (W)} = Q \times H \times \rho \times g$$

where:
- Q = capacity (m^3/s)
- H = total head/pressure (m)
- ρ = fluid density (kg/m^3)
- g = acceleration due to gravity (m/s^2)

Other forms of this equation can be as follows:

$$\text{Hydraulic Power (kW)} = \frac{Q \times H}{k}$$

where:
- Q = capacity
- H = total head/pressure
- k = constant (dependent upon units used)

Therefore

$$\text{Hydraulic Power (kW)} = \frac{Q \times H}{k}$$

where:
- Q = capacity (l/min)
- H = total head/pressure (bar)
- k = 600