Power to Lift or Hoist a Load

Power to raise a load at a speed through a mechanism efficiency, the motor power, the energy per lift and the potential energy gained.

Method: Textbook mechanics (power = force × velocity)

Input parameters

Unit system: SI

Parameter	Value	Unit
Mass lifted (load plus hook and cage)	2,000.0	kg
Lifting speed	15.000	m/min
Height of the lift	10.000	m
Efficiency of the gearing, ropes and drum	80.000	%

Calculated results

Parameter	Value	Unit
Power at the load m g v	4.9033	kW
Motor power P_l/η	6.1292	kW
Potential energy gained m g H	196.13	kJ
Time for the lift	40.000	s

Notes for this case

- Steady lifting; acceleration needs extra torque for a short time.

Formula and method

$$P_l = mgv, \quad P_m = \frac{P_l}{\eta}, \quad E_p = mgH$$

Variables

m	Mass lifted (load plus hook and cage)	kg
v	Lifting speed	m/s
H	Height of the lift	m
η	Efficiency of the gearing, ropes and drum	-
P_l	Power at the load m g v	W
P_m	Motor power P_l/η	W
E_p	Potential energy gained m g H	J
t	Time for the lift	s

Method and standards

Work and power.

Assumptions and limits

- Constant speed. The motor power has no allowance for acceleration torque, motor efficiency or a duty/service factor: add them for motor selection.

References

- Textbook mechanics (power = force × velocity)

Report details

Report reference	FCC-F7HB-P31V (the same inputs always give the same reference)
Generated	17 November 2026, 19:44 UTC
Calculator	Power to Lift or Hoist a Load
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/statics-dynamics/lifting-power

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.