Mill Power: Simplified Formula and Torque Number

Mill power from load, speed and diameter with a coefficient from Hugot Table 14.8 (P = k F n D), the Murry torque number, and power per tonne fibre per hour.

Method: Hugot; Handbook of Cane Sugar Engineering; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Coefficient k (kW per tonne-force, rpm and metre) Hugot Table 14.8 (kW): normal running about 0.20 first mill, 0.17 second, 0.15 third and later; peak values about a fifth higher.	0.14500	
Total hydraulic load	340.00	tf
Roller speed	5.0000	rpm
Roller diameter	0.81300	m
Crushing rate	100.00	t/h
Fibre % cane	14.500	%

Calculated results

Parameter	Value	Unit
Mill power at the rollers	200.40	kW
Murry torque number G/(F D)	0.14119	
Power per tonne fibre per hour	13.821	kWh/t

Notes for this case

- Hugot's example of a final mill 813 × 1676 mm at 5 rpm and 340 t load absorbs about 200 kW.

Formula and method

$$P = k\,F n\,D\ [\mathrm{kW};\ F\ \mathrm{t};\ n\ \mathrm{rpm};\ D\ \mathrm{m}],\quad N_M = \frac{G}{FD} = \frac{P}{2\pi n F D}$$

Variables

k	Coefficient k (kW per tonne-force, rpm and metre)	-
F	Total hydraulic load	N
n	Roller speed	1/s
D	Roller diameter	m
A	Crushing rate	kg/s
f	Fibre % cane	-
P	Mill power at the rollers	W
N_M	Murry torque number G/(F D)	-
$P/(Af)$	Power per tonne fibre per hour	J/kg

Method and standards

Hugot's simplified mill power and Murry's torque number.

Assumptions and limits

- Hugot's coefficients for 3-roller mills.
- With P = k F n D the Murry torque number reduces to N_M = 60k/(2πg) ≈ 0.974 k (k in kW per tonne-force, rpm and metre): it restates k in dimensionless form rather than adding information.
- The default k = 0.145 reproduces Hugot's final-mill example (about 200 kW); normal running values in his table are about 0.15–0.20.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 14
• eqns 14.9 and 14.11–14.12 and Table 14.8
• pp. 234–237

Report details

Report reference	FCC-K7CA-QGVS (the same inputs always give the same reference)
Generated	17 November 2026, 19:48 UTC
Calculator	Mill Power: Simplified Formula and Torque Number
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 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/sugar-ethanol/milling/mill-power-simplified

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.