Cane Shredder Power from Fibre Rate

Fibre throughput, shredder power and power per tonne of cane per hour from the crushing rate, fibre % cane and the specific power per tonne of fibre.

Method: P = ṁ_F e_F; specific power by maker or test (Rein, Cane Sugar Engineering); Hugot; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	250.00	t/h
Fibre % cane	14.500	%
Specific power per tonne of fibre Power expended (absorbed) in kW per t fibre/h, from tests; Hugot's good preparation needs 50–80. Installed power overstates the index.	60.000	kWh/t

Calculated results

Parameter	Value	Unit
Fibre throughput	36.250	t/h
Shredder power	2,175.0	kW
Power per tonne of cane per hour	8.7000	kWh/t
Expected preparation index 63.7 W^0.09 (W in kW per t fibre/h)	92.082	%

Notes for this case

• The preparation index fit (Hugot p. 62) has a correlation of only 0.66: use it as a trend. W is the power expended (absorbed); installed power overstates the index.

Formula and method

$$\dot{m}_F = C F_c, \quad P = \dot{m}_F e_F, \quad I.P. \approx 63.7\, W^{0.09}\ \% \ (W = e_F \text{ in kW per t fibre/h})$$

Variables

C	Crushing rate	kg/s
F_c	Fibre % cane	-
e_F	Specific power per tonne of fibre	J/kg
$\dot{m}_F$	Fibre throughput	kg/s
P	Shredder power	W
P/C	Power per tonne of cane per hour	J/kg
$I.P.$	Expected preparation index 63.7 W^0.09 (W in kW per t fibre/h)	-

Method and standards

Definitions.

Assumptions and limits

- Steady feed.
- In the preparation-index fit W is the power expended for preparation (absorbed), in kW per t fibre/h; Hugot tabulates it for 10–80 and finds a good index at 50–80. The default 60 is in that band. Outside 10–80 the index is extrapolated, and above 100 % it is capped; both are flagged.

References

• P = ṁ_F e_F; specific power by maker or test (Rein, Cane Sugar Engineering)
• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (1986)
• ch. 6

- preparation index against power
- p. 62

Report details

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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/cane-preparation/shredder-power

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.