Intermediate Carrier Speed, Layer and Power (Hugot)

Speed, bagasse layer thickness and motor of an intermediate carrier between mills from the mill speed and the fibre rate, by Hugot eqns 8.4 and 8.5.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	250.00	t/h
Fibre % cane	14.500	%
Peripheral speed of the mill fed	15.000	m/min
Carrier speed / mill speed Hugot: rake carriers 1.5–3; slat (apron) carriers about 1.1.	2.0000	
Carrier width	2.0000	m
Fibre (not bagasse) per cubic metre of bagasse layer Hugot: about 95 kg of fibre per m³ of layer on a rake carrier. This is fibre only, not the bulk density of the wet bagasse.	95.000	kg/m³

Calculated results

Parameter	Value	Unit
Carrier speed	30.000	m/min
Layer thickness	105.99	mm
Carrier motor (Hugot 0.075 kW per t cane/h)	18.750	kW

Notes for this case

- Hugot's rule of thumb: an intermediate carrier takes about 5 % of the power of the mill it feeds (not computed here).

Formula and method

$$V' = kV, \quad h = \frac{Af}{V' L \rho_f}, \quad T = 0.075\,A\ [\mathrm{kW},\ A \text{ in t/h}]$$

Variables

A	Crushing rate	kg/s
f	Fibre % cane	-
V	Peripheral speed of the mill fed	m/s
V'/V	Carrier speed / mill speed	-
L	Carrier width	m
ρ_f	Fibre per cubic metre of bagasse layer	kg/m³
V'	Carrier speed	m/s
h	Layer thickness	m
T	Carrier motor (Hugot 0.075 kW per t cane/h)	W

Method and standards

Hugot's continuity of fibre and his power rule.

Assumptions and limits

- Uniform layer; loose bagasse.
- ρ_f is fibre per m³ of layer, not the bulk density of the wet bagasse; entering a bagasse bulk density gives too thin a layer.
- In the motor rule A is in t/h and T in kW; the page converts from SI.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 8
• eqns 8.4–8.5 and p. 77

Report details

Report reference	FCC-FFK2-FBH9 (the same inputs always give the same reference)
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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/intermediate-carrier

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.