Prepared Cane Volume and Bed Depth by Stage

Volume flow of whole, knifed and shredded cane from their bulk densities, and the bed depth of prepared cane on a carrier, with bulk densities from Hugot.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	250.00	t/h
Bulk density, whole cane Hugot: tangled whole cane 125–150 kg/m³.	150.00	kg/m³
Bulk density after the knives Hugot: 250–300 kg/m³.	275.00	kg/m³
Bulk density after the shredder Hugot reports 400 (Kerr), 250–275 (Réunion) and 200–250 (Mauritius) kg/m³.	300.00	kg/m³
Speed of the carrier after the shredder	15.000	m/min
Carrier width	2.0000	m

Calculated results

Parameter	Value	Unit
Volume flow, whole cane	1,666.7	m³/h
Volume flow after the knives	909.09	m³/h
Volume flow after the shredder	833.33	m³/h
Overall compaction	2.0000	
Bed depth of shredded cane	462.96	mm

Formula and method

$$\dot{V}_i = \frac{A}{d_i}, \quad h_2 = \frac{A}{d_2\, u\, L}$$

Variables

A	Crushing rate	kg/s
d_0	Bulk density, whole cane	kg/m³
d_1	Bulk density after the knives	kg/m³
d_2	Bulk density after the shredder	kg/m³
u	Speed of the carrier after the shredder	m/s
L	Carrier width	m
$\dot{V}_0$	Volume flow, whole cane	m³/s
$\dot{V}_1$	Volume flow after the knives	m³/s
$\dot{V}_2$	Volume flow after the shredder	m³/s
d_2/d_0	Overall compaction	-
h_2	Bed depth of shredded cane	m

Method and standards

Continuity with measured bulk densities.

Assumptions and limits

- Densities from local measurement where possible. A density that falls from one stage to the next, or lies outside Hugot's 125–400

kg/m³, is flagged.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 3 (p. 32) and ch. 6 (p. 70)
• bulk densities of whole
• knifed and shredded cane

Report details

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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/cane-preparation/prepared-cane-volume

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.