Donnelly Chute Feed Pressure and Thickness (Hugot)

Pressure of the bagasse column at the foot of a Donnelly chute, Hugot eqn 8.9, and the chute thickness he recommends from the delivery opening.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Height of bagasse in the chute	2.5000	m
Bulk density of the bagasse in the chute Hugot: about 400 kg/m³ for the first mill (300–600).	400.00	kg/m³
Chute angle to the horizontal	80.000	°
Friction coefficient of bagasse on the plates Hugot: 0.25–0.30.	0.27000	
Delivery work opening of the mill	20.000	mm
Chute thickness / delivery opening Hugot: first and second mills 16 without a feed roller, 14 with one; final mill 12 and 10.	16.000	
Roller diameter	1.0000	m

Calculated results

Parameter	Value	Unit
Feed pressure at the chute foot	9.1979	kPa
Recommended chute thickness at the bottom	320.00	mm
Thickness / roller diameter	0.32000	

Notes for this case

- E/D is 0.32, outside the 0.40–0.75 of the roller diameter that Hugot finds in practice (thicker at lower mill speeds): check the ratio m and the opening.

Formula and method

$$F = Z\,d\,g\,(\sin\beta - \varphi\cos\beta), \quad E = m\,e_A, \quad \frac{E}{D}$$

Variables

Z	Height of bagasse in the chute	m
d	Bulk density of the bagasse in the chute	kg/m³
β	Chute angle to the horizontal	rad
φ	Friction coefficient of bagasse on the plates	-
e_A	Delivery work opening of the mill	m
m	Chute thickness / delivery opening	-
D	Roller diameter	m
F	Feed pressure at the chute foot	Pa
E	Recommended chute thickness at the bottom	m
E/D	Thickness / roller diameter	-

Method and standards

Hugot's static balance of the bagasse column on an inclined plate.

Assumptions and limits

- Static column; no pressure feeder.
- A note flags E/D outside Hugot's practical 0.40–0.75.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 8
• eqns 8.6–8.9 and recommended thicknesses
• pp. 84–88

Report details

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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/donnelly-chute-feed

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.