Clarifier Settling Area from Settling Velocity

Settling area a clarifier needs for the juice flow and the settling velocity of the mud, and the crush it serves per m² (Hugot ch. 29, Sabi and SRI data).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	100.00	t/h
Juice volume per tonne cane Hugot: about 0.9 m³ of juice per tonne cane. Add the filtrate if it returns to the clarifier (12–20 % more).	0.90000	m³/t
Settling velocity Hugot: Sabi trays 1 cm/min; SRI rapid clarifier 10 cm/min with flocculant.	10.000	mm/min
Installed settling area	150.00	m²

Calculated results

Parameter	Value	Unit
Settling area needed	150.00	m²
Area per t cane/h (m² per t/h)	1.5000	m²
Crush the installed area serves	100.00	t/h

Notes for this case

- Clarifier capacity depends on area, not depth (Hugot). Keep the juice velocity in each compartment below about 12 m/h to avoid turbulence.

Formula and method

$$S_r = \frac{A\,v_j}{u}, \quad A_S = \frac{S\,u}{v_j}$$

Variables

A	Crushing rate	kg/s
v_j	Juice volume per tonne cane	m³/kg
u	Settling velocity	m/s
S	Installed settling area	m²
S_r	Settling area needed	m²
S_r/A	Area per t cane/h (shown as m² per t/h)	m² per t/h
A_S	Crush the installed area serves	kg/s

Method and standards

Hindered-settling continuity.

Assumptions and limits

- Settling velocity from jar tests or plant data.
- The juice volume is what reaches the clarifier: include returned filtrate, which adds 12–20 % (see the clarifier mud filtrate calculator).
- For a multi-tray clarifier the settling area is the sum of the trays.

References

- Hugot
- Handbook of Cane Sugar Engineering

- 3rd ed. (Elsevier, 1986)
- ch. 29
- capacity of clarifiers
- pp. 434–445

Report details

Report reference	FCC-H8DR-FDM4 (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/clarification/clarifier-settling-area

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.