Rapid (SRI) Clarifier Area, Volume and Residence

Settling area, gross area with the deflector, volume and juice residence of a short-retention (SRI) clarifier from juice flow and settling rate (Hugot ch. 29).

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	1.0000	m³/t
Settling velocity Hugot (SRI): 10 cm/min.	100.00	mm/min
Share of the cross-section taken by the deflector	25.000	%
Working depth	1.2000	m

Calculated results

Parameter	Value	Unit
Net settling area	16.667	m²
Gross cross-section	22.222	m²
Diameter	5.3192	m
Volume	26.667	m³
Juice residence	16.000	min

Notes for this case

- Hugot (SRI): about 0.2 m² per t cane/h, 1.2 m deep, 20 min of juice; flocculant 1.5–3 ppm.
- The residence is on the gross volume, deflector space included, with no deduction for the mud zone; the juice's real residence is shorter.

Formula and method

$$S_n = \frac{A v_j}{u}, \quad S_g = \frac{S_n}{1-\phi_d}, \quad V = S_g H, \quad t_r = \frac{V}{A v_j}$$

Variables

A	Crushing rate	kg/s
v_j	Juice volume per tonne cane	m³/kg
u	Settling velocity	m/s
ϕ_d	Share of the cross-section taken by the deflector	-
H	Working depth	m
S_n	Net settling area	m²
S_g	Gross cross-section	m²
D	Diameter	m
V	Volume	m³
t_r	Juice residence	s

Method and standards

Settling continuity and geometry.

Assumptions and limits

- Steady flow; good flocculation.
- The residence uses the gross volume, including the deflector share, with no deduction for mud; the real juice residence is shorter.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 29
• short-retention clarifiers
• pp. 440–442

Report details

Report reference	FCC-W3Y9-N9XN (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/rapid-clarifier-sri

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.