Seed (Slurry) Quantity for a Target Crystal Size

Seed crystal mass and slurry volume to grow a strike's crystal mass to a target mean size from a seed size, by the crystal number balance, and the crystal count.

Method: Crystal number balance: same number of crystals; mass ∝ L³ (shape factor cancels for the seed mass) (Rein, Cane Sugar Engineering, pan boiling)

Input parameters

Unit system: SI

Parameter	Value	Unit
Crystal mass to produce per strike	30.000	t
Target mean crystal size	0.60000	mm
Seed crystal size	6.0000	µm
Crystal content of the seed slurry	250.00	g/L
Sucrose crystal density	1,588.0	kg/m³
Volume shape factor A typical value for sugar crystals; use your own if measured. It affects the crystal count only.	0.75000	

Calculated results

Parameter	Value	Unit
Seed crystal mass	30.000	g
Seed slurry volume	0.12000	L
Crystals (millions)	116,615	

Notes for this case

- Assumes every seed crystal grows and no new grain forms; in practice adjust for dissolution, conglomerates and false grain.

Formula and method

$$m_s = M_c \left(\frac{L_s}{L_f} \right)^3, \quad N = \frac{M_c}{\rho_c k_v L_f^3}$$

Variables

M_c	Crystal mass to produce per strike	kg
L_f	Target mean crystal size	m
L_s	Seed crystal size	m
C	Crystal content of the seed slurry	kg/m³
ρ_c	Sucrose crystal density	kg/m³
k_v	Volume shape factor	-
m_s	Seed crystal mass	kg
V_s	Seed slurry volume	m³
N	Crystals (millions)	-

Method and standards

Crystal number balance.

Assumptions and limits

- All seed grows; no new nuclei. Seed dissolution, conglomerates and the size distribution (mean against mass-mean size) are ignored: in practice more seed is needed.

- The defaults for crystal density (1 588 kg/m³) and shape factor (0.75) are typical values, not from a cited source; enter your own where known.

References

- Crystal number balance: same number of crystals
- mass ∝ L^3 (shape factor cancels for the seed mass) (Rein, Cane Sugar Engineering, pan boiling)

Report details

Report reference	FCC-VSHH-7BK9 (the same inputs always give the same reference)
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Calculator	Seed (Slurry) Quantity for a Target Crystal Size
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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/pan-boiling/seed-slurry-quantity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.