Batch Centrifugal Charge and Hourly Capacity (Hugot)

Massecuite a batch centrifugal basket holds from its size (Hugot eqns 35.18–35.23), the largest layer, and hourly massecuite and sugar from cycles and machines.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Basket diameter	1.2200	m
Basket height	0.76000	m
Layer thickness at full charge	150.00	mm
Cycles per hour	20.000	
Number of machines	4.0000	
Massecuite density	1,470.0	kg/m³
Sugar per massecuite (kg sugar per kg massecuite) By mass: the crystal content of the massecuite less what the wash dissolves.	45.000	%

Calculated results

Parameter	Value	Unit
Largest layer 0.14 D	170.80	mm
Charge from the layer, π e H (D − e)	383.21	L
Practical charge 340 D²H	384.60	L
Massecuite per hour (practical charge)	30.768	m³/h
Sugar per hour	20.353	t/h

Notes for this case

- The hourly output uses Hugot's practical charge 340 D²H (D, H in m); the layer and geometric charge are for checking the basket. Cycles: A and B 18–25 per hour, low grade 2–4.
- The charge from this layer is less than the practical charge used for the hourly output: the hourly figures are then optimistic.

Formula and method

$$e_M = 0.14D, \quad V = \pi e H (D - e), \quad V_p = 340 D^2 H \ [\mathrm{L};\ D, H \ \mathrm{m}], \quad \dot{V} = V_p N z, \quad \dot{m}_s = \dot{V} \rho_m x$$

Variables

D	Basket diameter	m
H	Basket height	m
e	Layer thickness at full charge	m
N	Cycles per hour	-
z	Number of machines	-
ρ_m	Massecuite density	kg/m³
x	Sugar per massecuite	-
e_M	Largest layer 0.14 D	m
V	Charge from the layer, π e H (D − e)	m³
V_p	Practical charge 340 D²H	m³
$\dot{V}$	Massecuite per hour (practical charge)	m³/s
$\dot{m}_s$	Sugar per hour	kg/s

Method and standards

Hugot's basket geometry rules.

Assumptions and limits

- Batch machines. The hourly output uses the practical charge; the layer thickness and geometric charge do not change it, but notes appear when the layer exceeds 0.14 D or gives less than the practical charge.
- x is kg of sugar per kg of massecuite.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 35
- capacity of centrifugals
- eqns 35.18–35.23
- pp. 766–770

Report details

Report reference	FCC-PE5A-XS0B (the same inputs always give the same reference)
Generated	17 November 2026, 19:37 UTC
Calculator	Batch Centrifugal Charge and Hourly Capacity (Hugot)
Method last reviewed	13 November 2026
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/centrifugals-sugar-house/centrifugal-basket-charge

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.