Continuous Centrifugal: Sugar, Molasses and G

Sugar and molasses from a continuous centrifugal by the purity balance (Delden, Hugot p. 802), wash water per m³ and the gravity factor at the basket rim.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Massecuite fed Hugot: C 4–8, B 7–15, A 20–30 t/h per machine.	8.0000	t/h
Massecuite brix	98.000	%
Massecuite purity	56.000	%
Sugar purity	96.000	%
Molasses purity	35.000	%
Massecuite density	1,500.0	kg/m³
Wash water per m³ massecuite Litres per m³; Hugot: 15–25 for C massecuite (Mauritius 35).	20.000	
Basket top diameter	1.0000	m
Speed	1,800.0	rpm

Calculated results

Parameter	Value	Unit
Sucrose in the sugar % massecuite (Delden; crystal plus its molasses film)	32.388	%
Sugar dry solids per massecuite	33.738	%
Sugar (dry solids)	2.6990	t/h
Molasses (dry solids)	5.1410	t/h
Wash water	106.67	L/h
Gravity factor at the rim (top diameter)	1,811.6	
Rim speed	94.248	m/s

Notes for this case

- Delden's example (P_s 96, P_m 56, B_m 98): molasses at 35 purity gives 32.4 % crystal, at 30 purity 37.1 %. Crystals leave at about rim speed; 9–18 m/s impact breaks them.
- Sugar and molasses are dry solids. Wash water is not in the dry-solids balance: it leaves as water with the molasses, and the crystal it dissolves shows in the measured molasses purity, so enter the purity measured with washing on.

Formula and method

$$\frac{S}{Q} = B_m \frac{P_m - P_e}{P_s - P_e}, \quad x = P_s \frac{S}{Q}, \quad \dot{m}_s = Q\frac{S}{Q}, \quad \dot{m}_M = Q\left(B_m - \frac{S}{Q}\right)$$

$$\dot{V}_w = \frac{Q}{\rho_m}\frac{w}{1000}, \quad \omega = 2\pi n, \quad G = \frac{\omega^2 D}{2g}, \quad v = \frac{\omega D}{2}$$

Variables

Q	Massecuite fed	kg/s
B_m	Massecuite brix	-

P_m	Massecuite purity	-
P_s	Sugar purity	-
P_e	Molasses purity	-
ρ_m	Massecuite density	kg/m³
$\mathcal{W}$	Wash water per m³ massecuite (litres per m³)	-
D	Basket top diameter	m
n	Speed	1/s
x	Sucrose in the sugar % massecuite (Delden; crystal plus its molasses film)	-
S/Q	Sugar dry solids per massecuite	-
$\dot{m}_s$	Sugar (dry solids)	kg/s
$\dot{m}_M$	Molasses (dry solids)	kg/s
$\dot{V}_w$	Wash water	m³/s
G	Gravity factor at the rim (top diameter)	-
ω	Angular speed	rad/s
g	Standard gravity	m/s²
v	Rim speed	m/s

Method and standards

Purity balance and centrifugal force.

Assumptions and limits

- Steady feed; no crystals through the screen.
- Sugar and molasses outputs are dry solids, not product masses; the wash water leaves with the molasses and is not in the dry-solids balance. Crystal dissolved by the wash is accounted for only through the measured molasses purity.
- G and rim speed are at the top (largest) diameter of the conical basket; the mean G over the cone is lower.

References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 35
• continuous centrifugals
• eqns 35.46–35.51 and Delden's crystal content
• pp. 794–806

Report details

Report reference	FCC-HSW2-E7MX (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Continuous Centrifugal: Sugar, Molasses and G
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/continuous-centrifugal-output

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.