Centrifugal Gravity Factor and Mean Radius (Hugot)

Gravity factor of a centrifugal at the basket wall and at Hugot's mean equivalent radius of the sugar layer (eqns 35.16–35.17), with the peripheral speed.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Basket diameter	1.2200	m
Thickness of the massecuite layer	203.00	mm
Speed	1,500.0	rpm

Calculated results

Parameter	Value	Unit
Mean equivalent radius	515.25	mm
Gravity factor at the basket wall	1,534.8	
Gravity factor at the mean radius	1,296.4	
Peripheral speed	95.819	m/s

Notes for this case

- Hugot's example: 1 220 mm basket, 203 mm layer, 1 500 rpm: mean radius 0.515 m and G about 1 297.
- The layer exceeds Hugot's working limit of about 0.14 D.

Formula and method

$$R = \frac{D}{2}, \quad r = R - e, \quad R_m = \frac{2}{3}\frac{R^3 - r^3}{R^2 - r^2}, \quad G_R = \frac{\omega^2 R}{g}, \quad G_m = \frac{\omega^2 R_m}{g}, \quad v = \omega R, \quad \omega = 2\pi n$$

Variables

D	Basket diameter	m
e	Thickness of the massecuite layer	m
n	Speed	1/s
R_m	Mean equivalent radius	m
G_R	Gravity factor at the basket wall	-
G_m	Gravity factor at the mean radius	-
v	Peripheral speed	m/s
$R\$, \$r$	basket radius and inner radius of the layer	m
ω	angular speed	rad/s
g	standard gravity	m/s²

Method and standards

Centrifugal force on the layer.

Assumptions and limits

- Uniform layer. A layer up to the radius is accepted; a note appears above Hugot's working limit of about 0.14 D.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 35
- eqns 35.4 and 35.16–35.17

- pp. 760–766

Report details

Report reference	FCC-NNGG-W0XR (the same inputs always give the same reference)
Generated	17 November 2026, 19:36 UTC
Calculator	Centrifugal Gravity Factor and Mean Radius (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-gravity-factor

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.