Pan Strike: Evaporation, Boiling Time and Strikes per Day

Water a pan evaporates in a strike from feed and massecuite brix and footing, the boiling time at a rate per m² (Hugot Table 33.7) and strikes per day.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Massecuite volume of the strike	30.000	m³
Massecuite density	1,470.0	kg/m³
Massecuite brix	93.000	%
Feed (syrup or molasses) brix	65.000	%
Share of the strike that is footing	30.000	%
Heating surface	180.00	m²
Mean evaporation rate Hugot Table 33.7 (South Africa, adopted): footings 79, A 59, B 49, C 39 kg/(m²·h).	59.000	kg/(m²·h)
Other time per cycle (fill, steam out, drop)	1.0000	h

Calculated results

Parameter	Value	Unit
Massecuite mass	44.100	t
Water evaporated	13.298	t
Boiling time	1.2522	h
Cycle time	2.2522	h
Strikes per day	10.656	

Notes for this case

- Hugot's boiling times: A 2.5–3 h, B 3–4 h, C 4–8 h; the rate falls through the strike as the level rises.
- Movement and wash water added during boiling are not included: they lengthen the boiling time.

Formula and method

$$M_m = \rho_m V, \quad E = (1-\phi) M_m \left(\frac{B_m}{B_f} - 1 \right), \quad t_b = \frac{E}{gS}, \quad n = \frac{24\ \text{h}}{t_b + t_a}$$

Variables

V	Massecuite volume of the strike	m³
ρ_m	Massecuite density	kg/m³
B_m	Massecuite brix	-
B_f	Feed (syrup or molasses) brix	-
ϕ	Share of the strike that is footing	-
S	Heating surface	m²
g	Mean evaporation rate	kg/(m²·s)
t_a	Other time per cycle (fill, steam out, drop)	s
M_m	Massecuite mass	kg
E	Water evaporated	kg

t_b	Boiling time	s
t_c	Cycle time	s
n	Strikes per day	-

Method and standards

Solids balance and Hugot's mean rates.

Assumptions and limits

- Feed and massecuite brix steady through the strike.
- Movement water and wash water added during boiling are not counted in E; they add evaporation, so the boiling time can be longer than shown.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 33
- evaporation in pans (Table 33.7) and boiling times
- pp. 660–675

Report details

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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/pan-boiling/pan-boiling-time

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.