Temperature Drops for Equal Evaporator Vessels

Share of the total temperature drop each vessel of a multiple effect with equal surfaces takes at minimum total surface (Hugot: 5 : 6 : 8 : 16 for a quadruple).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of effects	4.0000	
Total net temperature drop	54.700	K

Calculated results

Parameter	Value	Unit
Drop in effect 1	7.8143	K
Drop in effect 2	9.3771	K
Drop in effect 3	12.503	K
Drop in effect 4	25.006	K
Drop in effect 5	0	K

Notes for this case

- Hugot's proportions: triple 6 : 8 : 16, quadruple 5 : 6 : 8 : 16, quintuple 35 : 40 : 48 : 64 : 128.

Formula and method

$$\Delta_n = 1, \quad \Delta_i = \frac{\sum_{j>i} \Delta_j}{2(n-i)}, \quad \text{scaled so that } \sum \Delta_i = \Delta$$

Variables

n	Number of effects	-
Δ	Total net temperature drop	K
Δ_1	Drop in effect 1	K
Δ_2	Drop in effect 2	K
Δ_3	Drop in effect 3	K
Δ_4	Drop in effect 4	K
Δ_5	Drop in effect 5	K

Method and standards

Hugot's minimum-surface condition for equal vessels.

Assumptions and limits

- No vapour bleeding; equal surfaces.
- Hugot's proportions start at the triple effect; for n = 2 the same rule is applied by extension and a note says so. Drops for effects beyond n are shown as zero.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 32
- multiple effect with equal vessels
- p. 596 (from eqns 32.40–32.43)

Report details

Report reference	FCC-1FEK-6NW5 (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	Temperature Drops for Equal Evaporator Vessels
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 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/evaporation/evaporator-equal-vessel-drops

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.