Vapour Condensate Surplus and Effluent per Tonne Cane

Condensate made from juice vapours (evaporator and pans) per tonne cane, its uses (imbibition, boiler make-up, process), and the surplus to treat or recycle.

Method: Mass balance of vapour condensates in a sugar factory

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	100.00	t/h
Evaporator evaporation per tonne cane	800.00	kg/t
Of which leaves as vapour to the condenser	150.00	kg/t
Pan evaporation per tonne cane	120.00	kg/t
Pan vapour to the condensers	120.00	kg/t
Imbibition per tonne cane	300.00	kg/t
Boiler make-up from vapour condensate	50.000	kg/t
Other process uses	100.00	kg/t

Calculated results

Parameter	Value	Unit
Vapour condensate made per tonne cane	650.00	kg/t
Used per tonne cane	450.00	kg/t
Surplus per tonne cane	200.00	kg/t
Surplus	20.000	t/h

Notes for this case

- Vapour condensed in calandrias and heaters is the factory's main water source; vapour to the condensers mixes with cooling water and is lost to it. Exhaust condensate returns to the boilers and is not counted here.

Formula and method

$$C = E - e_x + E_p - p_x, \quad U = w + m_u + o, \quad \dot{m}_s = (C - U)A$$

Variables

A	Crushing rate	kg/s
E	Evaporator evaporation per tonne cane	kg/kg
e_x	Of which leaves as vapour to the condenser	kg/kg
E_p	Pan evaporation per tonne cane	kg/kg
p_x	Pan vapour to the condensers	kg/kg
w	Imbibition per tonne cane	kg/kg
m_u	Boiler make-up from vapour condensate	kg/kg
o	Other process uses	kg/kg
C	Vapour condensate made per tonne cane	kg/kg
U	Used per tonne cane	kg/kg
$C - U$	Surplus per tonne cane	kg/kg
$\dot{m}_s$	Surplus	kg/s

Method and standards

Water balance.

Assumptions and limits

- Steady crush.
- A negative surplus is a deficit to be made up with other water; it is flagged.

References

- Mass balance of vapour condensates in a sugar factory

Report details

Report reference	FCC-KKEX-CEEH (the same inputs always give the same reference)
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Calculator	Vapour Condensate Surplus and Effluent per Tonne Cane
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/vacuum-water/vapour-condensate-surplus

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.