Sugar Mill Steam Balance (Process, Exhaust and PRDS Make-up)

Process steam from steam % cane, the PRDS make-up or surplus exhaust against the turbine exhaust available, and boiler steam % cane.

Method: Mass balance of live; exhaust and process steam (Hugot; Rein)

Input parameters

Unit system: SI

Parameter	Value	Unit
Crushing rate	250.00	t/h
Process steam % cane	42.000	%
Exhaust from turbines (mill drives and TG)	90.000	t/h
Steam losses (share of generation)	3.0000	%

Calculated results

Parameter	Value	Unit
Process steam	105.00	t/h
PRDS make-up (live steam)	15.000	t/h
Surplus exhaust	0	t/h
Boiler steam	108.25	t/h
Boiler steam % cane	43.299	%

Notes for this case

- PRDS make-up is counted as live steam kilogram for kilogram; the desuperheating water it picks up (which adds to the exhaust mass) is ignored, so boiler steam is slightly overstated.

Formula and method

$$\dot{m}_p = C\,s_p, \quad \dot{m}_{PRDS} = \max(0, \dot{m}_p - \dot{m}_t), \quad \dot{m}_b = \frac{\dot{m}_t + \dot{m}_{PRDS}}{1 - k_l}$$

Variables

C	Crushing rate	kg/s
s_p	Process steam % cane	-
$\dot{m}_t$	Exhaust from turbines (mill drives and TG)	kg/s
k_l	Steam losses (share of generation)	-
$\dot{m}_p$	Process steam	kg/s
$\dot{m}_{PRDS}$	PRDS make-up (live steam)	kg/s
$\dot{m}_x$	Surplus exhaust	kg/s
$\dot{m}_b$	Boiler steam	kg/s
s_b	Boiler steam % cane	-

Method and standards

Mass balance.

Assumptions and limits

- Back-pressure turbines exhaust to process.
- PRDS make-up is counted 1:1 as live steam; the desuperheating water is not modelled, so boiler steam is slightly high when make-up is needed.

References

- Mass balance of live
- exhaust and process steam (Hugot; Rein)

Report details

Report reference	FCC-57Z2-E3FN (the same inputs always give the same reference)
Generated	17 November 2026, 19:36 UTC
Calculator	Sugar Mill Steam Balance (Process, Exhaust and PRDS Make-up)
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/steam-power/sugar-mill-steam-balance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.