Boiler Capacity for a Sugar Mill

Boiler steam needed for a crush from steam % cane, the design margin, and the rating of each boiler for the number in service and on standby.

Method: Steam balance: steam = TCD × steam % cane; margin and redundancy by design

Input parameters

Unit system: SI

Parameter	Value	Unit
Cane crushed per day	5,000.0	t/d
Boiler steam % cane	50.000	%
Design margin	10.000	%
Boilers in service	2.0000	
Standby boilers	0	
Time efficiency (share of the day the mill crushes) Crushing hours over 24 h; 85 to 95 % is common once mill stoppages are counted. At 100 % the crush is taken as steady over the day.	100.00	%

Calculated results

Parameter	Value	Unit
Steam demand while crushing	104.17	t/h
Required capacity with margin	114.58	t/h
Rating of each boiler	57.292	t/h
Installed capacity	114.58	t/h

Notes for this case

- Add the off-season and distillery loads if the boiler serves them.

Formula and method

$$\dot{m}_s = \frac{TCD\, s_b}{\eta_t}, \quad \dot{m}_r = \dot{m}_s(1+k), \quad \dot{m}_1 = \frac{\dot{m}_r}{N}, \quad \dot{m}_i = \dot{m}_1(N+N_s)$$

Variables

TCD	Cane crushed per day	kg/s
s_b	Boiler steam % cane	-
k	Design margin	-
N	Boilers in service	-
N_s	Standby boilers	-
$\dot{m}_s$	Steam demand while crushing	kg/s
η_t	Time efficiency: crushing hours over 24 h	-
$\dot{m}_r$	Required capacity with margin	kg/s
$\dot{m}_1$	Rating of each boiler	kg/s
$\dot{m}_i$	Installed capacity	kg/s

Method and standards

Steam balance: steam from the daily crush and steam % cane, raised by the time efficiency to the rate while the mill is crushing, a design margin on top, shared between the boilers in service; standby boilers add installed capacity of the same rating.

Assumptions and limits

- The time efficiency spreads the day's crush over the crushing hours. Short peaks above the mean crushing rate are not included:

put them in the margin.
- Whole numbers of boilers.

References
- Steam balance: steam = TCD × steam % cane; margin and redundancy by design

Report details

Report reference	FCC-J3AP-FSRM (the same inputs always give the same reference)
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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
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