Boiler Size for a KLPD Distillery

Steam demand and boiler rating for a distillery from its capacity and the specific steam of distillation, dehydration, evaporation and other users, with a margin.

Method: Steam balance on specific consumptions (kg per litre of alcohol)

Input parameters

Unit system: SI

Parameter	Value	Unit
Plant capacity (absolute alcohol)	100.00	kL/d
Distillation steam	2.3000	kg/L
Dehydration steam	0.40000	kg/L
Spent wash evaporation steam	2.0000	kg/L
Other users (liquefaction, CIP, tracing)	0.30000	kg/L
Design margin	15.000	%

Calculated results

Parameter	Value	Unit
Total specific steam	5.0000	kg/L
Average steam demand	20.833	t/h
Boiler rating with margin	23.958	t/h

Notes for this case

- Check steam pressure levels too: multi-pressure distillation and MEE need different pressures.

Formula and method

$$s_t = s_d + s_h + s_e + s_o, \quad \dot{m}_b = \dot{V}_e s_t (1 + k)$$

Variables

$\dot{V}_e$	Plant capacity (absolute alcohol)	m³/s
s_d	Distillation steam	kg/m³
s_h	Dehydration steam	kg/m³
s_e	Spent wash evaporation steam	kg/m³
s_o	Other users (liquefaction, CIP, tracing)	kg/m³
k	Design margin	-
s_t	Total specific steam	kg/m³
$\dot{m}_s$	Average steam demand	kg/s
$\dot{m}_b$	Boiler rating with margin	kg/s

Method and standards

Steam balance.

Assumptions and limits

- Average steady load.
- Specific steam figures are by mass with no pressure or enthalpy basis; the boiler rating in t/h holds only at the steam conditions those figures assume. A boiler at higher pressure feeding the process through a PRDS and desuperheater delivers a different mass.
- The default specific steam figures (2.3 + 0.4 + 2.0 + 0.3 = 5.0 kg/L) are starting values without a particular source; use your plant's or the supplier's figures.
- Specific steam is entered and shown in kg/L in every unit system.

References

- Steam balance on specific consumptions (kg per litre of alcohol)

Report details

Report reference	FCC-R39Q-SS0D (the same inputs always give the same reference)
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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/ethanol/klpd-boiler-size

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.