Economiser Steaming Margin (Approach to Saturation)

Approach of the economiser water outlet temperature to saturation at drum pressure (IF97) at full and part load, and whether the economiser may steam.

Method: Saturation temperature from IAPWS-IF97; approach to saturation = saturation temperature at drum pressure minus water outlet temperature (definition)

Input parameters

Unit system: SI

Parameter	Value	Unit
Drum pressure (absolute)	70.000	bar
Water out at full load	250.00	°C
Water out at part load	265.00	°C
Minimum approach wanted	15.000	K

Calculated results

Parameter	Value	Unit
Saturation temperature	285.83	°C
Approach at full load	35.830	K
Approach at part load	20.830	K

Formula and method

$$\Delta T_{100} = T_{sat}(p_d) - T_{w,100}, \quad \Delta T_{\lambda} = T_{sat}(p_d) - T_{w,\lambda}$$

Variables

p_d	Drum pressure (absolute)	Pa
$T_{w,100}$	Water out at full load	K
$T_{w,\lambda}$	Water out at part load	K
ΔT_{min}	Minimum approach wanted	K
T_{sat}	Saturation temperature	K
ΔT_{100}	Approach at full load	K
ΔT_{λ}	Approach at part load	K

Method and standards

The approach is the saturation temperature at drum pressure (IAPWS-IF97) minus the water outlet temperature, at full and at part load.

Assumptions and limits

- Steady state. The part-load water outlet temperature is your input; the calculator has no part-load model.
- Drum pressure is used; the economiser outlet runs a little higher, so the approach shown is slightly conservative (smaller).

References

• Saturation temperature from IAPWS-IF97; approach to saturation = saturation temperature at drum pressure minus water outlet temperature (definition)

Report details

Report reference	FCC-ABD9-EGD8 (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	Economiser Steaming Margin (Approach to Saturation)
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/boilers-power-plant/furnace-heating-surfaces/economiser-steaming-margin

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.