Furnace Water-Wall Average and Peak Heat Flux

Average heat flux on furnace water walls from the heat absorbed and the projected wall area, and the peak flux for a peaking factor.

Method: q = Q/A (definition); peak factor by design practice

Input parameters

Unit system: SI

Parameter	Value	Unit
Heat absorbed by the water walls The heat taken up by the furnace water walls only (evaporator duty in the furnace), not the heat released by the fuel or the whole boiler duty.	30.000	MW
Projected water-wall area The flat (projected) area of the furnace walls covered by water-wall tubes, not the tube surface. Include roof and hopper as your design convention does.	400.00	m²
Peak-to-average factor From the boiler maker or a furnace heat-flux profile; 1.6 is a FireCAD starting value, not a sourced figure.	1.6000	

Calculated results

Parameter	Value	Unit
Average heat flux	75.000	kW/m²
Peak heat flux	120.00	kW/m²

Notes for this case

- Compare the peak flux with the critical heat flux at the local pressure and quality.

Formula and method

$$q_{avg} = \frac{\dot{Q}_a}{A_p}, \quad q_{peak} = k_p q_{avg}$$

Variables

$\dot{Q}_a$	Heat absorbed by the water walls	W
A_p	Projected water-wall area	m²
k_p	Peak-to-average factor	-
q_{avg}	Average heat flux	W/m²
q_{peak}	Peak heat flux	W/m²

Method and standards

Definition: the average flux is the heat absorbed by the water walls over their projected area; the peak flux applies a peak-to-average factor from the boiler maker or a measured profile.

Assumptions and limits

- The average is over the whole projected area; the peak factor gives the local maximum (burner zone, flame impingement). Its default, 1.6, is a FireCAD starting value, not a sourced figure.
- The heat input must be the water-wall absorption, not the heat released; the area is the flat projected wall area, with roof and hopper as your convention counts them.
- The peak flux is not compared with a CHF here: use the critical heat flux calculators.

References

- q = Q/A (definition); peak factor by design practice

Report details

Report reference	FCC-TJMV-FESY (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Furnace Water-Wall Average and Peak Heat Flux
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/water-wall-heat-flux

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.