Reheater Duty (Cold to Hot Reheat)

Heat absorbed by a boiler reheater from the reheat steam flow and the cold and hot reheat pressures and temperatures, with the pressure drop (IAPWS-IF97).

Method: IAPWS-IF97

Input parameters

Unit system: SI

Parameter	Value	Unit
Reheat steam flow	520.00	t/h
Cold reheat pressure (absolute)	42.000	bar
Cold reheat temperature	330.00	°C
Hot reheat pressure (absolute)	39.000	bar
Hot reheat temperature	540.00	°C

Calculated results

Parameter	Value	Unit
Reheater duty	72.399	MW
Enthalpy rise	501.23	kJ/kg
Pressure drop, share of inlet pressure	7.1429	%
Cold reheat enthalpy	3,037.1	kJ/kg
Hot reheat enthalpy	3,538.3	kJ/kg

Formula and method

$$\dot{Q}_{rh} = \dot{m}_{rh}\,(h_{hrh} - h_{crh}) \qquad \frac{\Delta p}{p} = \frac{p_{crh} - p_{hrh}}{p_{crh}}$$

Variables

$\dot{m}_{rh}$	reheat steam flow	kg/s
p_{crh}	cold reheat pressure	Pa
T_{crh}	cold reheat temperature	K
p_{hrh}	hot reheat pressure	Pa
T_{hrh}	hot reheat temperature	K
$\dot{Q}_{rh}$	reheater duty	W
Δh	enthalpy rise	J/kg
$\Delta p/p$	pressure drop share	–
h_{crh}	cold reheat enthalpy	J/kg
h_{hrh}	hot reheat enthalpy	J/kg

Method and standards

Steam-side energy balance with IAPWS-IF97 superheated steam enthalpies.

Assumptions and limits

- Steady state; flow includes any spray added before the reheater. The duty then treats the spray as if it entered at the cold reheat enthalpy; spray water injected at feedwater enthalpy needs the extra heat m_spray (h_crh − h_spray) added.
- A note appears when the pressure drop is above 10 % of the cold reheat pressure.

References

- IAPWS-IF97

Report details

Report reference	FCC-N8BY-GA46 (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

https://calc.firecad.com/boilers-power-plant/furnace-heating-surfaces/reheater-steam-duty

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.