Air Heater Cold-End Average Temperature vs Acid Dew Point

Cold-end average temperature of an air preheater from gas exit and air inlet temperatures and its margin over the acid dew point, to judge cold-end corrosion risk.

Method: CEAT = (T_g,out + T_a,in)/2 (air heater practice); acid dew point from the acid-dew-point calculator

Input parameters

Unit system: SI

Parameter	Value	Unit
Gas out (corrected for leakage)	140.00	°C
Air in	30.000	°C
Acid dew point	120.00	°C

Calculated results

Parameter	Value	Unit
Cold-end average temperature	85.000	°C
Margin over the dew point	-35.000	K

Notes for this case

- CEAT below the acid dew point: expect cold-end corrosion; use a steam coil air heater or air bypass.

Formula and method

$$CEAT = \frac{T_{g,out} + T_{a,in}}{2}, \quad \Delta T = CEAT - T_{dp}$$

Variables

$T_{g,out}$	Gas out (corrected for leakage)	K
$T_{a,in}$	Air in	K
T_{dp}	Acid dew point	K
$CEAT$	Cold-end average temperature	K
ΔT	Margin over the dew point	K

Method and standards

The cold-end average temperature is the mean of the leakage-corrected gas outlet and air inlet temperatures, a common proxy for the lowest metal temperature. Here it is compared with the acid dew point. Air heater makers usually specify a minimum CEAT that depends on the fuel sulphur and the heater type; use that limit where you have it.

Assumptions and limits

- Simple average; the gas must leave hotter than the air enters.
- The margin flags corrosion only against the dew point, with a warning below 10 K (a FireCAD rule of thumb, not a maker's curve).

References

- CEAT = (T_g,out + T_a,in)/2 (air heater practice); acid dew point from the acid-dew-point calculator

Report details

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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/boilers-power-plant/furnace-heating-surfaces/cold-end-average-temperature

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.