Outdoor Air Share for a Target Mixed Air Temperature

Outdoor air share of a mixing box to reach a target mixed air temperature from the return and outdoor temperatures, with the outdoor and return air flows.

Method: Sensible mixing balance T_m = T_r + x(T_o − T_r)

Input parameters

Unit system: SI

Parameter	Value	Unit
Return air temperature	24.000	°C
Outdoor air temperature	10.000	°C
Target mixed air temperature	13.000	°C
Total supply air flow	20,000	m³/h
Minimum outdoor air share	15.000	%

Calculated results

Parameter	Value	Unit
Outdoor air share	78.571	%
Outdoor air	15,714	m³/h
Return air	4,285.7	m³/h
Mixed temperature actually reached	13.000	°C

Notes for this case

- Sensible mixing by volume, close enough for dampers; the share is held between the minimum and 100 %.

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/hvac/psychrometry/economiser-mixing-ratio

Variables

T_r	Return air temperature	K
T_o	Outdoor air temperature	K
T_m	Target mixed air temperature	K
$\dot{V}$	Total supply air flow	m³/s
x_{min}	Minimum outdoor air share	-
x	Outdoor air share	-
$\dot{V}_o$	Outdoor air	m³/s
$\dot{V}_r$	Return air	m³/s
$T_m{}'$	Mixed temperature actually reached	K

Method and standards

Mixing balance.

Assumptions and limits

- Perfect mixing.

References

- Sensible mixing balance T_m = T_r + x(T_o − T_r)

Report details

Report reference	FCC-WS0K-9EFH (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Outdoor Air Share for a Target Mixed Air Temperature
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
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/hvac/psychrometry/economiser-mixing-ratio

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.