False Air Ingress from Oxygen Rise Across a Section

False (leakage) air entering a kiln, preheater, duct or mill section from the oxygen measured before and after it, as a share of the gas and as a flow.

Method: Oxygen balance across a non-combusting section

Input parameters

Unit system: SI

Parameter	Value	Unit
Oxygen before the section (dry)	2.5000	%
Oxygen after the section (dry)	4.5000	%
Gas flow before the section	250,000	Nm³/h
Oxygen in the air	20.950	%

Calculated results

Parameter	Value	Unit
False air as a share of the gas before the section	12.158	%
False air flow	30,395	Nm³/h
False air as a share of the gas after the section	10.840	%

Notes for this case

• Leakage air brings oxygen in but nothing burns in a preheater cyclone, duct or mill, so an oxygen balance gives the leak: V_1O_1 + V_a O_a = (V₁ + V_a)O₂, hence V_a/V₁ = (O₂ − O₁)/(O_a − O₂). Every per cent of false air cools the gas and loads the ID fan; preheater false air of more than about 10 % across the tower usually points to worn flap valves, inspection doors or expansion joints. Use dry oxygen readings taken at the same time.

Formula and method

$$\frac{\dot{V}_a}{\dot{V}_1} = \frac{O_{2,2} - O_{2,1}}{O_{2,a} - O_{2,2}}$$

Variables

$O_{2,1}$	Oxygen before the section (dry)	-
$O_{2,2}$	Oxygen after the section (dry)	-
$\dot{V}_1$	Gas flow before the section	Nm³/s
$O_{2,a}$	Oxygen in the air	-
f_a	False air as a share of the gas before the section	-
$\dot{V}_a$	False air flow	Nm³/s
$f_{a,out}$	False air as a share of the gas after the section	-

Method and standards

False air.

Assumptions and limits

- No combustion in the section; dry oxygen.

References

Oxygen balance across a non-combusting section

Report details

Report reference	FCC-VBEF-9QZH (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/chemical/cement/false-air-from-oxygen

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.