SCR Ammonia Dose and Slip

Ammonia for selective catalytic reduction (SCR) from the NOx load, the reduction and the allowed slip (NH_3 : NO ≈ 1 : 1), as anhydrous or aqueous ammonia.

Method: Stoichiometry 4 NO + 4 NH_3 + O_2 → 4 N_2 + 6 H_2O (NH_3 : NO = 1); slip on the molar volume at 0 °C; 1 atm

Input parameters

Unit system: SI

Parameter	Value	Unit
Flue gas flow (dry, normal)	100,000	Nm³/h
NOx at the inlet (as NO_2, dry)	400.00	mg/Nm³
NOx reduction wanted	80.000	%
Ammonia slip (dry, by volume)	3.0000	ppm
Ammonia strength of the reagent (1 for anhydrous)	25.000	%

Calculated results

Parameter	Value	Unit
Ammonia (100 %)	12.074	kg/h
Reagent	48.297	kg/h
Molar ratio to inlet NOx	0.81539	

Notes for this case

- Slip rises as the catalyst ages; ammonia with SO_3 forms ammonium bisulphate that fouls air heaters.

Formula and method

$$\dot{n}_{NH_3} = \eta \dot{n}_{NO_x} + \frac{\dot{V}_n y_{NH_3}}{V_m}, \quad \dot{m}_r = \frac{\dot{n}_{NH_3} M_{NH_3}}{w}$$

Variables

$\dot{V}_n$	Flue gas flow (dry, normal)	Nm³/s
c_{NO_x}	NOx at the inlet (as NO_2, dry)	kg/m³
η	NOx reduction wanted	-
y_{NH_3}	Ammonia slip (dry, by volume)	-
w	Ammonia strength of the reagent (1 for anhydrous)	-
$\dot{m}_{NH_3}$	Ammonia (100 %)	kg/s
$\dot{m}_r$	Reagent	kg/s
NH_3/NO_x	Molar ratio to inlet NOx	-

Method and standards

Stoichiometry of the standard SCR reaction, one NH_3 per NOx molecule reduced (NOx counted as NO_2 for its mass), plus the slip at the outlet on the molar volume at 0 °C and 1 atm.

Assumptions and limits

- Dry, normal basis.
- All NOx is treated as NO reacting 1 : 1. NO_2 (usually 5–10 % of boiler NOx) reacts by other routes and ammonia lost by oxidation on the catalyst is not counted; allow a margin on the dose from the catalyst maker.

References

- Stoichiometry 4 NO + 4 NH_3 + O_2 → 4 N_2 + 6 H_2O (NH_3 : NO = 1); slip on the molar volume at 0 °C
- 1 atm

Report details

Report reference	FCC-09PC-9PQX (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	SCR Ammonia Dose and Slip
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/emissions-stacks/scr-ammonia-dose

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.