# Stack Gas Moisture by Condensation (EPA Method 4)

Moisture fraction of stack gas from water collected in impingers and silica gel and the dry gas metered (EPA Method 4), checked against saturation.

**Method:** US EPA Method 4; 40 CFR Part 60 Appendix A-3 (determination of moisture content in stack gases); ...

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Water collected (impingers plus silica gel) | 45.200 | g |
| Dry gas metered | 850.00 | L |
| Dry gas meter calibration factor | 1.0000 | |
| Meter temperature | 25.000 | °C |
| Meter pressure (absolute) | 100.50 | kPa |
| Stack temperature | 60.000 | °C |
| Stack pressure (absolute) | 100.00 | kPa |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Water vapour at 20 °C, 101.325 kPa | 60.355 | L |
| Dry gas at 20 °C, 101.325 kPa | 828.94 | L |
| Moisture fraction measured | 6.7868 | % |
| Moisture at saturation (stack conditions) | 19.946 | % |
| Moisture to report (the lower) | 6.7868 | % |

## Formula and method

$$V_{w,std} = \frac{m_w}{M_w}\frac{RT_{std}}{p_{std}}, \quad V_{m,std} = V_m Y \frac{T_{std}}{T_m}\frac{p_m}{p_{std}}, \quad B_{ws} = \frac{V_{w,std}}{V_{w,std} + V_{m,std}}$$

### Variables

| | | |
|---|---|---|
| $m_w$ | Water collected (impingers plus silica gel) | kg |
| $V_m$ | Dry gas metered | m³ |
| $Y$ | Dry gas meter calibration factor | - |
| $T_m$ | Meter temperature | K |
| $p_m$ | Meter pressure (absolute) | Pa |
| $T_s$ | Stack temperature | K |
| $p_s$ | Stack pressure (absolute) | Pa |
| $V_{w,std}$ | Water vapour at 20 °C, 101.325 kPa | m³ |
| $V_{m,std}$ | Dry gas at 20 °C, 101.325 kPa | m³ |
| $B_{ws}$ | Moisture fraction measured | - |
| $B_{ws,sat}$ | Moisture at saturation (stack conditions) | - |
| $B_{ws,rep}$ | Moisture to report (the lower) | - |
| $M_w$ | Molar mass of water, 18.015 | kg/kmol |
| $R$ | Universal gas constant, 8.314 462 618 | J/(mol·K) |
| $T_{std}, p_{std}$ | Standard conditions, 293.15 K and 101 325 Pa | K, Pa |

### Method and standards

EPA Method 4 calculations in SI.

### Assumptions and limits

- Ideal gas; standard conditions 20 °C, 101.325 kPa.

### References

- US EPA Method 4
- 40 CFR Part 60 Appendix A-3 (determination of moisture content in stack gases)
- standard conditions 20 °C and 101.325 kPa; IAPWS-IF97 saturation pressure

## Report details

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|---|---|
| Report reference | FCC-YVRA-7X25 (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:44 UTC |
| Calculator | Stack Gas Moisture by Condensation (EPA Method 4) |
| 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/environmental/air-pollution/stack-gas-moisture-method-4

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.