Filter Pressure Drop at a Different Air Flow

Pressure drop of an air filter at a new air flow from a known drop at a reference flow by the power law, with the share of the final (change) pressure drop.

Method: Power law Δp ∝ V̇ⁿ (n ≈ 1 for laminar flow through fibrous media)

Input parameters

Unit system: SI

Parameter	Value	Unit
Pressure drop at the reference flow	12.237	mmWC
Reference flow	3,400.0	m³/h
New flow	3,000.0	m³/h
Flow exponent About 1 for fibrous media in laminar flow, up to 2 for coarse filters; from the maker's curve.	1.0000	
Final (change) pressure drop	25.493	mmWC

Calculated results

Parameter	Value	Unit
Pressure drop at the new flow	10.797	mmWC
Share of the final drop	42.353	%

Formula and method

$$\Delta p_2 = \Delta p_1 \left(\frac{\dot{V}_2}{\dot{V}_1} \right)^n$$

Variables

Δp_1	Pressure drop at the reference flow	Pa
$\dot{V}_1$	Reference flow	m³/s
$\dot{V}_2$	New flow	m³/s
n	Flow exponent	-
Δp_f	Final (change) pressure drop	Pa
Δp_2	Pressure drop at the new flow	Pa
$\Delta p_2 / \Delta p_f$	Share of the final drop	-

Method and standards

Power law.

Assumptions and limits

- Same filter loading. A drop above the final (change) value is flagged.

References

- Power law Δp ∝ V̇ⁿ (n ≈ 1 for laminar flow through fibrous media)

Report details

Report reference	FCC-2ZR8-4C7Y (the same inputs always give the same reference)
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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/hvac/ducts/filter-pressure-drop-flow

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.