Fan Power and Specific Fan Power (SFP) of an Air Handler

Fan electrical power from air flow and total pressure rise with fan, motor and drive efficiencies, the specific fan power and the annual energy and cost.

Method: Fan power and specific fan power; CIBSE Guide A; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Air flow	18,000	m³/h
Total pressure rise	900.00	Pa
Fan efficiency	70.000	%
Motor efficiency	93.000	%
Drive (belt or VFD) efficiency	95.000	%
Operating hours per year	4,000.0	h
Electricity price per kWh	0.12000	

Calculated results

Parameter	Value	Unit
Air power	4.5000	kW
Electrical power	7.2763	kW
Specific fan power (kW per m³/s = W per L/s)	1.4553	kJ/m³
Annual energy	29.105	MWh
Annual cost	3,492.6	

Notes for this case

- P = V̇Δp/(η_fη_mη_d); SFP = P/V̇ (1 kW per m³/s = 1 W per L/s). Good modern supply-and-extract units reach about 1.5–2 kW/(m³/s) in total; low pressure drop across filters, coils and ducts is the main lever.

Formula and method

$$P_e = \frac{\dot{V}\Delta p}{\eta_f \eta_m \eta_d}, \quad SFP = \frac{P_e}{\dot{V}}$$

Variables

$\dot{V}$	Air flow	m³/s
Δp	Total pressure rise	Pa
η_f	Fan efficiency	-
η_m	Motor efficiency	-
η_d	Drive (belt or VFD) efficiency	-
t	Operating hours per year	s
c_e	Electricity price per kWh	-
P_a	Air power	W
P_e	Electrical power	W
SFP	Specific fan power (kW per m³/s = W per L/s)	J/m³
E	Annual energy	J
C	Annual cost	-

Method and standards

Fan power.

Assumptions and limits

- Steady operating point.

References

Fan power and specific fan power, CIBSE Guide A, Environmental Design (CIBSE)

Report details

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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/ahu-specific-fan-power

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.