Quick Air Conditioner Size for a Room

Rough cooling capacity for a room from floor area and a fabric-and-sun load per m², occupants, lighting and equipment, in kW, tons of refrigeration and BTU/h.

Method: Room cooling load by unit-area allowance; ASHRAE Handbook of Fundamentals (ASHRAE)

Input parameters

Unit system: SI

Parameter	Value	Unit
Floor area	25.000	m²
Fabric and solar load per m² of floor	0.10000	kW/m²
Occupants	3.0000	
Sensible heat per person	0.075000	kW
Latent heat per person	0.055000	kW
Lighting per m²	0.008000	kW/m²
Equipment heat	0.40000	kW
Safety factor	1.1000	

Calculated results

Parameter	Value	Unit
Sensible load	3.3250	kW
Latent load	0.16500	kW
Cooling capacity to select	3.8390	kW
Capacity in tons of refrigeration	1.0916	TR
Capacity in BTU/h	13,099	Btu/h

Notes for this case

- Rule-of-thumb sizing: fabric and solar load per m² (about 60–80 W/m² for shaded rooms in mild climates, 120–180 W/m² for sunny rooms in hot climates) plus people, lights and equipment. Use a proper heat-gain calculation for anything beyond a single room.

Formula and method

$$Q = k\left[A(q_A + q_{lt}) + N(q_s + q_l) + Q_{eq}\right]$$

Variables

A	Floor area	m²
q_A	Fabric and solar load per m² of floor	W/m²
N	Occupants	-
q_s	Sensible heat per person	W
q_l	Latent heat per person	W
q_{lt}	Lighting per m²	W/m²
Q_{eq}	Equipment heat	W
k	Safety factor	-
Q_s	Sensible load	W
Q_l	Latent load	W
Q	Cooling capacity to select	W

Method and standards

Quick sizing.

Assumptions and limits

- Rule-of-thumb loads; single room.

References

Room cooling load by unit-area allowance, ASHRAE Handbook of Fundamentals (ASHRAE)

Report details

Report reference	FCC-M3NV-E38K (the same inputs always give the same reference)
Generated	23 November 2026, 17:50 UTC
Calculator	Quick Air Conditioner Size for a Room
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
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/hvac/loads/ac-size-quick-estimate

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.