Heat Gain from Electric Motors in a Room

Heat released into a room by an electric motor and its driven machine, for motor and machine both inside, motor outside, or machine outside the room.

Method: Motor heat gain for the three arrangements; P/η; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Motor rated output	15.000	kW
Load factor (share of rated output)	80.000	%
Use factor (share of time running)	100.00	%
Motor efficiency at that load	91.000	%
Arrangement	Motor and driven machine in the room	
Number of such motors	2.0000	

Calculated results

Parameter	Value	Unit
Heat per motor	13.187	kW
Total heat to the room	26.374	kW

Formula and method

$$\dot{Q} = \frac{P_r F_{LM} F_{UM}}{\eta_m}, \quad P_r F_{LM} F_{UM}, \quad P_r F_{LM} F_{UM} \frac{1 - \eta_m}{\eta_m}$$

Variables

P_r	Motor rated output	W
F_{LM}	Load factor (share of rated output)	-
F_{UM}	Use factor (share of time running)	-
η_m	Motor efficiency at that load	-
$\mathrm{arrangement}$	Arrangement	-
n	Number of such motors	-
$\dot{Q}_1$	Heat per motor	W
$\dot{Q}$	Total heat to the room	W

Method and standards

Energy balance.

Assumptions and limits

- Steady running.

References

- Motor heat gain for the three arrangements
- P/η
- P and P(1 − η)/η (ASHRAE Handbook—Fundamentals ch. 18)

Report details

Report reference	FCC-4YKE-2WPY (the same inputs always give the same reference)
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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/motor-heat-gain-room

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.