Emergency Lighting Battery Capacity

Battery capacity for a central emergency lighting system from luminaire load, duration, battery voltage, inverter efficiency and ageing and temperature factors.

Method: Battery sizing for a constant-power load

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of luminaires	40.000	
Power per luminaire in emergency mode	0.008000	kW
Rated duration	3.0000	h
Battery voltage	216.00	V
Inverter and wiring efficiency	85.000	%
Ageing factor (end-of-life capacity margin)	1.2500	
Temperature factor	1.1000	
Allowed depth of discharge	80.000	%

Calculated results

Parameter	Value	Unit
Total emergency load	0.32000	kW
Energy for the duration	0.96000	kWh
Battery discharge current	1.7429	A
Required battery capacity	8.9869	Ah

Notes for this case

- C = I·t·k_a·k_t/DoD with I = P/(ηV). Battery capacity also depends on the discharge rate (check the maker's table for the duration, often 1 or 3 hours); national rules set durations and test routines.

Formula and method

$$I = \frac{nP_l}{\eta V}, \quad C = \frac{Itk_a k_t}{DoD}$$

Variables

n	Number of luminaires	-
P_l	Power per luminaire in emergency mode	W
t	Rated duration	s
V	Battery voltage	V
η	Inverter and wiring efficiency	-
k_a	Ageing factor (end-of-life capacity margin)	-
k_t	Temperature factor	-
DoD	Allowed depth of discharge	-
P	Total emergency load	W
E	Energy for the duration	J
I	Battery discharge current	A
C	Required battery capacity	C

Method and standards

Emergency battery sizing.

Assumptions and limits

- Constant power load.

References

Battery sizing for a constant-power load

Report details

Report reference	FCC-DH6E-W3RP (the same inputs always give the same reference)
Generated	23 November 2026, 18:08 UTC
Calculator	Emergency Lighting Battery Capacity
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/electrical/lighting/emergency-lighting-battery

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.