Battery Room Hydrogen Generation and Ventilation Air

Hydrogen evolved by a vented battery from its gas-producing current by Faraday's law, and the ventilation air flow to hold hydrogen below a chosen concentration.

Method: Faraday's law of hydrogen evolution

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of cells	110.00	
Rated capacity	400.00	Ah
Gas-producing current per 100 Ah	1.0000	A
Room temperature	20.000	°C
Allowed hydrogen concentration	1.0000	%
Safety factor on gas evolution	2.0000	
Room volume	60.000	m³

Calculated results

Parameter	Value	Unit
Gas-producing current	4.0000	A
Hydrogen evolved	197.46	L/h
Ventilation air flow	39.491	m³/h
Air changes per hour	0.65819	1/h

Notes for this case

• Each cell produces H_2 at I/(2F) mol/s from the overcharge (gas) current; at 20 °C that is about 0.45 L per ampere-hour per cell. Air needed = s·V̇_H₂/c_max. Gas currents depend on technology, float or boost charge and temperature (several times higher when boost charging): take them from the battery maker or the user's standard. Hydrogen's lower flammable limit is 4 %.

Formula and method

$$\dot{n}_{H_2} = \frac{In}{2F}, \quad \dot{V}_{H_2} = \frac{\dot{n}_{H_2} RT}{p}, \quad \dot{V}_a = \frac{s\dot{V}_{H_2}}{c_{max}}$$

Variables

n	Number of cells	-
C	Rated capacity	C
I_g	Gas-producing current per 100 Ah	A
T	Room temperature	K
c_{max}	Allowed hydrogen concentration	-
s	Safety factor on gas evolution	-
V_r	Room volume	m³
I	Gas-producing current	A
$\dot{V}_{H_2}$	Hydrogen evolved	m³/s
$\dot{V}_a$	Ventilation air flow	m³/s
n_{ac}	Air changes per hour	1/s

Method and standards

Hydrogen ventilation.

Assumptions and limits

- All gas current produces hydrogen; ideal gas; well-mixed room.

References

Faraday's law of hydrogen evolution

Report details

Report reference	FCC-P3YA-WE67 (the same inputs always give the same reference)
Generated	23 November 2026, 18:08 UTC
Calculator	Battery Room Hydrogen Generation and Ventilation Air
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/batteries-ups/battery-room-hydrogen-ventilation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.