Description about the venting area for battery rooms

This document describes the calculation of ventilation requirements for battery rooms according to EN 50272-2 Chapter 8. During charging, whether at float or boost charge all kinds of lead acid batteries are gassing. This is a result of the electrolysis from water. When escaping into the environment an explosive gas mixture can be generated. This occurs when the hydrogen concentration exceeds 4%$_{Vol.}$. To avoid more than 4%$_{Vol.}$ hydrogen concentration every battery room must be ventilated (naturally or technical forced).

Following formulas has to be used for calculating for the exchange air flow:

Ventilation air flow $Q = 0{,}05 * n * I * C_{10}/1000$ [m³/h]

(n = number of cells, I = gas producing current in mA per Ah (as given in EN 50272-2 chapter 8.2, C10 in Ah)

	vented	**valve-regulated**
Float charge	**2,23 V/cell**	**2,25 - 2,27V/Z**
EN 50272-2	**I_{gas} = 5 mA/Ah**	**I_{gas} =1 mA/Ah**
VDE 0510-2	*5mA/Ah*	*2,5 mA*
Buffer operation	**2,40V/Z**	**2,40V/Z**
EN 50272-2	**I_{gas} = 20 mA/Ah**	**I_{gas} = 8 mA/Ah**
VDE 0510-2	*10 mA/Ah*	*5 mA/Ah*

The air flow is preferably ensured by natural ventilation, otherwise with technical ventilation. Battery rooms or cabinets require an air inlet and an exhaust opening with a minimum cross-section. The opening size can be calculated by the following equation.

Vent area for natural air in- and outlet: $A_{(area)} = 28 \times Q$ [cm²]

Example:

Predominantly float charge (appr. once a month)

30 cells 6 OPzS 600 *(vented)*

Q = 0,05 x 30 x 5 x 600/1000 = 4,5m³/h

A = 28 x Q = 28 x 4,5m³/h = ***A = 126 cm²***

(for the inlet and 126 cm² for the outlet)

30 cells 6 OPzV 600 *(valve regulated)*

Q = 0,05 x 30 x 1 x 600/1000 = 0,9m³/h

A = 28 x Q = 28 x 0,9 m³/h = ***A = 25,2 cm²***

(for the inlet and 126 cm² for the outlet)

Values for I_{gas} at charging with IU- and U-charger

	Lead-Acid Vented (Sb < 3%) [1]	Lead-Acid Valve regulated
Gas Emission Factor f_g	1	0.2
Safety Factor for Gas Emission f_s (including 10% defective cells and aging)	5	5
Float Voltage U_{float} [2] V/cell	2.23	2.27
Typical Float Current I_{float} mA per Ah	1	1
Current (Float Charge) I_{gas} mA per Ah (refers only to the calculation of air flow at float charge)	5	1
Boost Charge Voltage U_{boost} [2] V/cell	2.4	2.4
Typical Boost Charge Current I_{boost} mA per Ah	4	8
Current (Boostcharge) I_{gas} mA per Ah (refers only to the calculation of air flow at boost charge)	20	8

[1] at higher antimony levels appropriate value has to be requested at the manufacturer

[2] float and boost charge can be differ according to the specific electrolyte weight

Source: EN 50272-2, Chapter 8.2 Ventilation Requirements