Gassing Rates of Concorde Valve Regulated Lead Acid Batteries

The following table gives data for the rate of hydrogen escape at different charging voltages and two different temperatures. The rate increases as the charging voltage increases and as the battery temperature increases. The table also gives the required airflow to keep the hydrogen level below 1%.

Charge Voltage	Rate of hydrogen gas escape (cc/hour/Ah/cell)		Airflow required to keep hydrogen accumulation below 1% (Liter/minute/Ah/cell)	
	25°C (77°F)	50°C (122°F)	25°C (77°F)	50°C (122°F)
2.30	0.06	0.71	0.000010	0.0012
2.35	0.11	1.3	0.00018	0.0022
2.40	0.26	1.6	0.00043	0.0027
2.45	0.68	2.3	0.0011	0.0038
2.50	4.8	5.6	0.0080	0.0093
2.55	10	13	0.017	0.022
2.60	22	25	0.037	0.042

The rate in the table is in terms of cc/hour per Ah of capacity and per cell. To get the rate for a particular battery, multiply the number in the table by the battery's rated 24hr capacity and the number of cells.

> For example, the PVX-1040T has a rated capacity of 104Ah at the 24-hr rate and has 6 cells. The rate of hydrogen gas escape under normal charging conditions of 2.40VPC and 25°C is: 0.26 x 104 x 6 = 162 cc/hour. The required airflow to keep the hydrogen accumulation below 1% is: 0.000433 x 104 x 6 = 0.27 Liters/minute or 0.01 cubic feet/minute. As this number illustrates, a very low rate of airflow is sufficient under these conditions.

The airflow rate should be calculated for the worst case conditions expected over the life of the battery installation (e.g., highest charging voltage and highest temperature). The installation should then be designed to have this minimum airflow any time the battery is being charged.

The above data is based on the use of constant voltage charging. If the installation uses constant current charging (not recommended), the rate of hydrogen escape can be much higher. If the constant current is not properly terminated, the maximum rate of hydrogen escape can be calculated from the following equation (assumes no recombination):

R (cc/hour) = 418 x No. Cells x Current (Amps)

The required airflow to keep hydrogen accumulation below 1% is:

Airflow (Liter/minute) = 0.70 x No. Cells x Current (Amps)

> For example, charging a 6 cell battery at 10 amps will give:
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> R = 418 x 6 x 10 = 25,080 cc/hour
> Airflow = 0.70 x 6 x 10 = 42 Liters/minute (1.5 cubic feet/minute)

This airflow is about 150 times greater than the number given above for constant voltage charging.

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