Risk Of Un monitoring Hydrogen Gas in Lead Acid

Introduction

Risk of monitored and unmonitored both Lead Acid and Nickel Cadmium batteries produce flammable hydrogen gas during charging. Overcharging, excessive heat and many other factors can quickly cause batteries to produce even more hydrogen. As hydrogen builds up, the risk of fire, explosion and material degradation increases. This white paper explores the types of hazards presented by hydrogen, how hydrogen can build up, and the changing regulations and codes that address battery charging stations and installations. A discussion follows on monitoring solutions to meet those regulations and prevent danger. To begin with, some real-world cases illustrate the need and effectiveness of direct monitoring.

The hazards of hydrogen explained:

In both Motive Power and Stationary battery system charging, hydrogen is a byproduct during the charging of battery chemistry. This generated hydrogen can subsequently ignite or explode depending on the environmental conditions in the charging area. So higher the temperature, the more explosive the reaction. Hydrogen buildup from battery recharging stations is extremely flammable, and it begins to accelerate the degradation of materials in the area. Not only do batteries begin to degrade, shortening their life span, but it also causes degradation of all Figure Ithe other components and hardware. Even a small increase in H2 production can quickly become dangerous.

Various types of degradation caused by hydrogen:

- **Hydrogen blistering:** Absorption of atomic hydrogen on the surface of low resistance materials resulting in blisters
- **Hydrogen embrittlement:** Absorption of atomic hydrogen on the surface of high resistance materials resulting in low ductility and increased internal stress
- **Hydrogen induced cracking and hydrogen stress cracking:** Blister formation that may affect the integrity of materials especially when stressed Combined, this means that in any facility that has a battery charging system the chance of buildup and ignition is significant. For example, under the right conditions, a typical room where forklifts recharge can take just 6 hours to reach a high enough concentration of hydrogen to cause an explosion in the absence of ventilation. And since it is odorless, it is hard to detect.

Portable vs. full installation solutions:

Portable and integrated hydrogen monitoring solutions are two monitoring options often used in both motive and stationary battery testing. Portable monitors are handheld units that give information the moment the readings are

taken but provide no protection between readings. In between readings, if fans fail, ventilation systems get blocked or obstructed, power to cooling systems fails or nature sends temperatures soaring; the danger can be catastrophic. Use of portable monitors to periodically check integrated monitoring solutions is an excellent way to ensure proper operation of an integrated monitoring system. Permanent (life of the charging stations) integrated hydrogen monitoring solutions continuously monitor the levels of hydrogen. Integrated solutions typically meet all the regulations and can be tied in with alarm/SCADA monitoring systems to provide early warning and maximum protection. Some hydrogen detectors can also operate a room's exhaust system to dissipate hydrogen when it is first detected. Charger manufacturers are currently working to integrate hydrogen detection with control of charging voltages to prevent the continued gas evolution into an area where a buildup of hydrogen gas already exists.

Effect of Hydrogen on Lead Battery:

Both Lead Acid and Nickel Cadmium batteries produce flammable hydrogen gas during normal charging. Overcharging, excessive heat and many other factors can quickly cause batteries to produce even more hydrogen. As hydrogen builds up, the risk of fire, explosion and material degradation increases.

Effect of Hydrogen on Atmosphere:

Emissions of hydrogen lead to increased burdens of methane and ozone and hence to an increase in global warming. Therefore, hydrogen can be considered as an indirect greenhouse gas with the potential to increase global warming.

Effect of Hydrogen on Human Body:

Lead is a toxic metal that can enter the body by inhalation of lead dust or ingestion when touching the mouth with lead-contaminated hands. If leaked onto the ground, acid and lead particles contaminate the soil and become airborne when dry. Children and fetuses of pregnant women are most vulnerable to lead exposure because their bodies are developing. Excessive levels of lead can affect a child's growth, cause brain damage, harm kidneys, impair hearing and induce behavioral problems. In adults, lead can cause memory loss and lower the ability to concentrate, as well as harm the reproductive system. Lead is also known to cause high blood pressure, nerve disorders, and muscle and joint pain. Researchers speculate that Ludwig van Beethoven became ill and died because of lead poisoning.

How to overcome the Hydrogen from battery?

From over loss of hydrogen gas from cell of the battery we must use to prevent fumes mist eliminators and an exhaust suction System.

Conclusion

In best practices, H2 monitoring systems should be linked to an auxiliary ventilation system and to fire and building monitoring control systems. This is due to the fact that, at any time, primary and/or secondary ventilation systems can fail causing the heat to rise along with the risk of an H2 explosion. An easily integrated hydrogen detection

system mitigates the risk, provides a warning, and allows time to prevent catastrophe. If you have any type of battery recharging system or station, an installed and permanently mounted hydrogen detection system not only provides protection but will meet upcoming changes to building and safety codes.