Technical Note

SureCell™ — The Next Generation of Electrochemical Sensors

Electrochemical sensors have proven popular for toxic gas detection due to their low power requirements, small size, and low cost. However, field studies have shown that not all designs can adapt to extreme environments without suffering some degree of cell degradation or failure. Honeywell Analytics' patented SureCell™ electrochemical sensing technology overcomes the performance issues of conventional technology in high-temperature and high-humidity environments.

Electrochemical Sensor Design

A conventional electrochemical sensor is comprised of a housing, a filter, and a single large reservoir between two electrodes, as shown in Figure 1. The electrolyte reacts with the target gas to produce a small current that is picked up by the electrodes, amplified, and then displayed via the instrument being used. Such electro-chemical sensors are often employed in environments with extreme temperatures (+130°F/+55°C) or high humidity levels (>95% RH). Electrochemical sensors fail routinely in such harsh environments. At high humidities, water is absorbed by the electrolyte, which causes the unit to expand. This can result in cells bursting. At the other extreme—cold, low-humidity environments—cells fail because they become dehydrated of electrolyte.

The innovative design of Honeywell Analytics' SureCell™ (shown in Figure 2) incorporates two electrolyte reservoirs. The first, between the two electrodes, has a high capillary action that draws the electrolyte from the second reservoir.

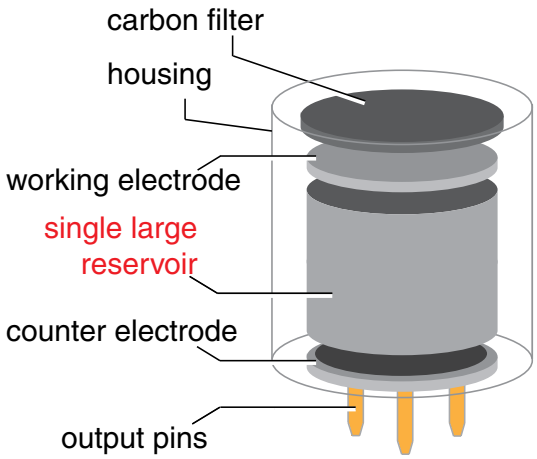

Figure 1:
Conventional cell technology

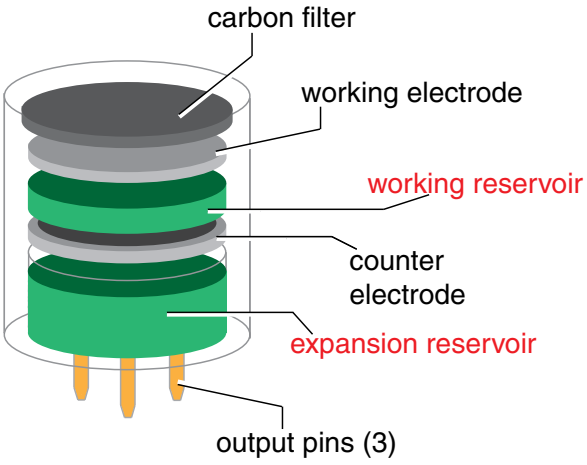

Figure 2:
SureCell™ dual-reservoir technology

The SureCell™ dual-reservoir approach offers significant advantages over conventional cell designs. Similar to an old-fashioned oil lamp, the first reservoir never runs dry in low-humidity applications. In areas of high humidity, moisture absorbed by the electrolyte is pushed back into the expansion reservoir. Since the expansion reservoir is never full (see Figure 3), the risk of of cell burst is greatly reduced and the expansion reservoir ensures that the working reservoir is always saturated with electrolyte. This provides an uninterrupted electron path and a cell that is always ready to perform.

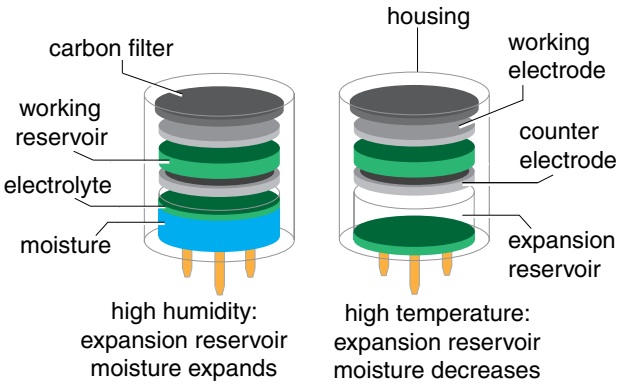

Figure 3:
SureCell™ response to heat and humidity

Summary

Electrochemical sensors are ideally suited to monitoring toxic gases, but vary in their ability to withstand continuous high temperature and humidity, a condition typically found in industrial environments where the monitoring of hydrogen sulfide, carbon monoxide, and other industrial gases is a critical safety requirement. The dual-reservoir electrochemical cell technology found in Honeywell Analytics' SureCell™ sensors offers significant improvements to sensor performance in these extreme environments resulting in lower sensor failure rates, longer sensor life, accurate gas readings, and faster speed of response to target gases.

SureCell™ sensing technology is used in fixed gas detection products such as the XNX Universal Transmitter, the Sensepoint XCD Gas Detector, the Series 3000 MkII Gas Detector, and portable products such as the Impact and Impact Pro.

Find out more
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1998-0671, Rev 2 • 9/10