Electrochemical Sensors Application Note 1
Electrochemical Sensor Characteristics Related to Intrinsic Safety

INTRODUCTION

This application note provides information to end-users with respect to the intrinsic safety considerations of instrumentation. The approach taken with regard to this application note has been developed with advice from a certified body.
SGX Sensortech have developed a range of Electrochemical sensors for the detection of Carbon Monoxide and Hydrogen Sulfide. These sensors are drop-in replacements for existing electrochemical sensors and the electrical characteristics of the SGX Sensortech sensors will be identical to all intents and purposes. This is a direct result of the electrochemistry of the catalysts used in, and the mechanical design of the sensor.

SCOPE

There are two situations, depending on whether the end-user instrument is already certified or is awaiting certification:

Certified Instrumentation

In existing instruments, the certifying body has already considered the performance of the electrochemical sensors. This process may have involved considering the maximum voltage, current, energy and power, which could be produced by the sensor in normal operation and open/short-circuit conditions. Tests carried out at SGX Sensortech have confirmed that the Carbon Monoxide and Hydrogen Sulfide sensors have the same performance limits as existing sensors fitted in these instruments in that they do not produce outputs greater than 1.2 V, 0.1 A or 25 mW. Test data are available on request. Testing has confirmed that the theoretical maximum voltages are not achieved for example the highest voltage recorded by a Carbon Monoxide sensor is only ~0.7 V compared with a theoretical value of 1.25 V.

New Instruments Awaiting Certification

Extensive consideration has been given to the effect of these sensors on intrinsic safety compliance. This not only involves the sensor output characteristics but also the sensor circuitry within the instrument. The situation is still open to interpretation but the essence appears to be whether the sensor could add to the supply voltage in the instrument. If the worst possible case is considered, then the sensor maximum voltages should be added to the total circuit voltage when determining the overall capacitance ‘budget’ of that sector of the intrinsically safe circuit. The higher the voltage assumed, the lower the permitted maximum capacitance. Contact SGX Sensortech for the relevant sensor voltages or for further information.