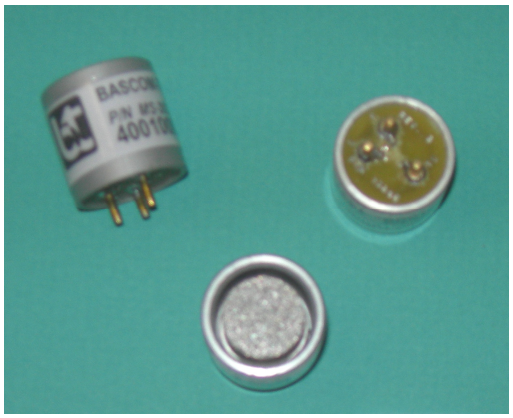
SENSOR BOOSTING WITH N-CAL

By George Champey

Catalytic sensors, used widely in the natural gas industry, are robust and easy to install and calibrate. These sensors depend for their performance on the oxidation of combustible vapors and gases on a catalytically active surface. Catalytic activity can be degraded by adsorption of various airborne impurities. Potential catalyst poisons include chlorinated organics, sulfur containing compounds, airborne lead, and compounds of some metalloids, particularly silicon.



Give your sensors a boost. Boosting Bascom-Turner methane sensors significantly improves sensor life, and can be done automatically when calibrating a detector using a Bascom-Turner docking

Bascom-Turner methane sensors are not significantly affected by chlorides or sulfides because of their composition and operating temperature. Airborne lead concentrations have been reduced essentially to zero ever since lead compounds were removed from gasoline. What remains as a potential poison is silicon derived from commercial silicones with an appreciable vapor pressure.

Silicon inhibits oxidation of methane on a catalytic sensor. The effect is cumulative, that is, some loss of catalyst activity occurs each time a sensor is exposed to silicones. However, Bascom-Turner has developed a proprietary process which treats a sensor in a detector and restores its activity. The process involves heating in a cleansing gas, commonly referred to as “boost gas,” followed by a short conditioning step to stabilize the sensor at its new, higher activity. Boosting and conditioning take less than three minutes and can be carried out automatically while a detector is being calibrated in a docking station.

Boosting is most effective if done regularly starting when a sensor is first put into service. The optimal frequency for boosting is about twice a month. An example of what can be expected from boosting is offered by sensors deployed in New England and boosted about twice a month. The sensitivity of a sensor can be expressed by

$$\text{Gain} = (\text{Constant})*(\text{Reading}) / (\text{Concentration})$$

where the constant is determined by calibration. Typically, the gain is a number in the low thousands, for example 3885 in one specific case. Over the next 27 months, the gain of this sensor, as determined by calibration, had a low value of 3510, a high value of 4082, and over all declined by less than 5%. To put this in context, sensors with gains in the mid-1500’s are still reliable. It is clear that boosting during docking calibration helped maintain sensors at peak activity and extended their useful life.