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Uncharted Territory

NAVIGATING THE
CHANGING LANDSCAPE OF
DOT COLLECTIONS

18 Expanding Service Offerings
as a Survival Strategy for
Every Economy

26 Partners for Success
with DATIA

34 DATIA Elects New
Leadership and Sets Goals
for Coming Year

Choosing the Right Personal or Professional Breathalyzer. What You Need to Know.

Understanding the strengths and weaknesses of each alcohol sensing technology is important to selecting the right breathalyzer for your needs.

Alcohol is the most widely used drug in the United States, and according to the National Institute of Health, alcohol related problems cost the U.S. nearly \$185 billion yearly in lost productivity, additional healthcare and insurance costs, not to mention the personal toll that alcohol related accidents cause in the workplace and on our highways. With so much at stake, it's not surprising that government, business and the general public are taking more responsibility for personal and workplace breath alcohol testing.

This article provides an overview of two of the most commonly encountered breath alcohol testing technologies available to professional and personal users of portable breath testers. Understanding the strengths and weaknesses of each alcohol sensing technology is important to selecting the right breathalyzer for your needs.

Semiconductor Breath Testers. Buyer Beware.

The market for consumer breathalyzers has become a multi-million dollar business segment. Today, personal breathalyzers can be found on the internet, in retail stores and in many specialty shops. There are a proliferation of brands and models at price points from a few dollars to several hundred dollars. The marketers have done their homework and concentrated on reducing product size, lowering price and increasing the visual appeal of personal breathalyzers. But do they work?

The vast majority of the less expensive consumer alcohol breath testing devices for sale use an alcohol sensing technology called "semiconductor sensing," also known as "silicone oxide sensing."

All breathalyzers sold to consumers in the US are required to be FDA cleared. The FDA only requires consumer breathalyzers

to be tested as "screeners," meaning the device only has to detect the presence of alcohol in the breath. The FDA screener tests are not intended to test, measure or approve breathalyzer breath alcohol content (BAC) measurement accuracy. The protocol was developed to test instruments intended to *screen* for the presence of breath alcohol. As such FDA clearance is of no value in judging the ability of a breathalyzer to accurately measure breath alcohol content.

Semiconductor breath alcohol sensing technology has never been approved by either the Department of Transportation (DOT) or the Food and Drug Administration (FDA) for the accurate measurement of BAC. Frequently, marketers of semiconductor breathalyzers will reference their DOT/NHTSA approved status and/or their FDA cleared status. This lends credibility to their marketing claims but in either case the approval refers only to the devices having been tested and approved as alcohol screeners.

Recently, Lifeloc commissioned 3rd party accuracy and reliability testing of popular consumer breathalyzers. The study, showed what many professionals have long known. Semiconductor alcohol testers produce extreme variation in BAC measurement across multiple tests at a given BAC. Individual models may read either high or low but this is of little comfort because of the wide variability from test to test. Independent 3rd party tests confirmed that semiconductor consumer breathalyzers, despite the hyperbole of their marketers, are unsuitable for applications where BAC measurement accuracy and precision are required.

Additional drawbacks to semiconductor trustworthiness include:

- **Non alcohol specific.** Semiconductors may react to other volatile chemicals such as hairspray, gasoline vapor, cigarette smoke, and breath acetone.



- **Short working life.** Rarely longer than a year for many models depending on how much they are used.
- **Sensor saturation.** Sensor saturation with alcohol or contamination with smoke during a test can rapidly destabilize the semiconductor device and throw-off the results.
- **Drift.** Semiconductors show a wide variation in readings especially as the unit gets older and receives more use.
- **Recalibration.** Options to recalibrate are either nonexistent or poorly explained to consumers.

Fuel Cell Breathalyzers and the Professional User

Professional markets for breath alcohol testing have also been growing. No longer the exclusive domain of Law Enforcement and DOT regulated business, today many non DOT regulated businesses have taken it upon themselves to address their productivity, safety and social responsibility issues by implementing “fit for duty” alcohol and drug testing.

Professional breath alcohol testing instruments use a platinum fuel cell rather than semiconductor technology to detect and measure breath alcohol content. In fuel cell instruments, the breath is directed into a fuel cell with dual platinum electrodes where alcohol is oxidized and generates electrical current. The higher the alcohol content of the breath, the greater the output current of the fuel cell. This current is a direct indication of the amount of alcohol consumed by the fuel cell. By precisely measuring the current produced in the fuel cell, an accurate measure of BAC is recorded.

Fuel cell technology of this type has additional advantages over semiconductors.

- **Alcohol specific.** Semiconductor devices can give positive alcohol readings even when no alcohol is present. Fuel cell measurements are alcohol specific.
- **High accuracy.** Quality fuel cell testers are consistently accurate across a wide

alcohol concentration range from .000 to .400 BAC.

- **Calibration stability.** Unlike semiconductors which require frequent re-calibration, fuel cell devices generally require recalibration only once per year under normal use.
- **Long working life.** Semiconductor devices that have a short life span. Fuel cell instruments have an expected working life of 5-8 years.
- **Reliability.** The combination of long working life, calibration stability, alcohol specificity, and high precision all add up to a device that when properly maintained can be trusted to perform.

Professional testing is often evidential in nature. The measurement accuracy and precision of professional fuel cell devices is tested and approved by the Department of Transportation. The DOT has two testing protocols, one for alcohol screening devices and one for evidential instruments (devices whose BAC measurement will stand up in a court of law). As a public service the DOT publishes two “conforming products” lists of testers that have passed their testing; a Screener List and an Evidential List.

Unlike personal use breathalyzers regulated by the FDA, DOT approved evidential testers are required to have a manufacturer's Quality Assurance Plan (QAP). The QAP insures proper use and performance of the Portable Breath Analyzer in conformance with of the U.S. Department of Transportation Regulations and the procedure for conducting alcohol testing as set forth in 49 CFR, Part 40.

Frequently semiconductor devices cleared by the FDA as screeners will also appear on the DOT conforming products list of screeners. However, you will never find a semiconductor device on the DOT conforming products list of evidential breathalyzers. You will also never find the results of a semiconductor breathalyzer accepted by a court of law. ■

Personal Use Summary

- Look for FDA clearance as an indication of device safety and as confirmation that the device will screen for the presence of breath alcohol.
- If accurate BAC measurement is desired, a quality fuel cell device is worth the additional investment.
- Ensure that your device can be recalibrated by the factory or an authorized dealer and plan on doing so according to manufacturer recommendations.

Professional Use Summary

- If you require the device to perform as an alcohol screener only, choose from the DOT Conforming Products List of Alcohol Screeners.
- If you require the device to accurately measure BAC, choose from the DOT Conforming Products List of Evidential breath alcohol testers. Evidential devices are by default also alcohol screeners.
- Ensure that your device can be recalibrated by the factory or an authorized dealer and plan on doing so according to the manufacturers recommendations



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