



Countermeasures That Work – Alcohol Measurement Devices

The National Highway Traffic Safety Administration has published its 10th edition of *Countermeasures That Work*, a basic reference to assist State Highway Safety Offices and other highway safety professionals in selecting effective, evidence-based countermeasures for traffic safety problem areas. This Traffic Tech highlights the effective alcohol measurement countermeasures from Chapter 1, Alcohol and Drug-Impaired Driving.

Background

Driving after drinking is deadly, yet it continues to happen across the United States, where every day almost 30 people in the United States die in alcohol-impaired-driving crashes. These deaths have declined in the last few decades; however, alcohol-impaired crashes still claim more than 10,000 lives per year.

Alcohol reduces brain function by impairing essential abilities required to safely operate a vehicle. As alcohol levels rise in a person's system, the negative effects become more apparent. Because alcohol is absorbed directly into the bloodstream, alcohol can be measured by the weight of the alcohol in a certain volume of blood. This is called the blood alcohol concentration, or BAC. At a BAC of .08 grams of alcohol per deciliter (g/dL) of blood, the crash risk increases exponentially; however, even a small amount of alcohol can affect driving ability. For these reasons, it is illegal in every State to drive with a BAC of .08 g/dL or higher (except Utah, which recently lowered its illegal limit to .05 g/dL). It is imperative for law enforcement to be able to detect driver BACs to enforce these laws and help reduce alcohol-impaired driving. In NHTSA's *Countermeasures That Work*, alcohol measurement devices are detailed as an evidence-based and widely used countermeasure to combat this issue.

The following sections discuss behavioral countermeasures for alcohol measurement devices that have been supported by research as consistently effective across situations (★★★★), effective in certain situations (★★★), or promising/likely effective (★★). For more information on these countermeasures, their effectiveness, cost, use,

and time to implement, see the full *Countermeasures That Work* report.

Breath Test Devices

Countermeasure	Effectiveness	Cost	Use	Time
2.3 Breath Test Devices	★★★★	\$\$	High	Short

Breath test devices are stationary or portable alcohol sensors used to measure drivers' breath alcohol concentration (BrAC). Breath tests use a different measuring scale from blood tests, but are often "converted" to BAC terminology, such as .08 g/dL. They are commonly used by law enforcement officers in the field to help establish probable cause for a DWI arrest.

There are two main categories of breath test devices used by law enforcement: evidential breath test devices (EBTs) and preliminary breath test devices (PBTs or alcohol screening devices—ASDs). For both types, the driver blows into a mouthpiece and the breath test displays an objective (i.e., a specific BrAC level) or subjective result (e.g., a light or mark for alcohol positive). For each category, NHTSA maintains a list of extensively tested devices that meet NHTSA Model Specifications (see NHTSA's website for more information on these specifications at www.nhtsa.gov/drunk-driving/alcohol-measurement-devices). Further, ASD and EBT devices are designed strictly for alcohol detection and are incapable of detecting the presence of drugs other than alcohol.

Evidential Breath Alcohol Measurement Devices (EBTs) are mobile (e.g., transported to a non-fixed operational site) or non-mobile (e.g., designed to be operated at a fixed location) devices that measure the alcohol content of deep lung breath samples with sufficient accuracy for evidential purposes. They are State-approved and conform to NHTSA's Model Specifications. The results from EBTs are used as evidence in court because they provide objective test results of precise BrAC levels.

Preliminary Breath Test Devices or Alcohol Screening Devices are roadside devices used by law enforcement to establish

probable cause prior to arrest; however, unlike EBTs, they are rarely used as evidence in court. Rather than indicating specific BrAC levels, these devices use some threshold (e.g., .02 g/dL) with a pass/fail approach to indicate the presence of alcohol. Although they provide a different function than EBTs, PBTs and ASDs have also been extensively researched and determined to be effective alcohol-impaired driving countermeasures.

Costs vary widely, from \$200 to \$2,000 apiece. Implementation can be immediate after purchase, as long as officers are trained in their use, maintenance, and the regularly required calibration checks. Importantly, some States' laws restrict drivers being arrested for DWI from being tested by more than one chemical BAC test. These States do not use ASDs because evidential BAC tests cannot be requested thereafter.

Passive Alcohol Sensors

Countermeasure	Effectiveness	Cost	Use	Time
2.4 Passive Alcohol Sensors	★★★★	\$\$	High	Short

In addition to the evidentiary and preliminary devices, **Passive Alcohol Sensors** are usually integrated into law enforcement officers' flashlights or clipboards to measure alcohol presence in the air where the drivers are breathing. They are particularly useful in situations requiring quick screening, with little or no opportunity for officers to observe the drivers on the road, such as at traffic stops or checkpoints. The breath test device displays a BrAC range, such as a red light for any BAC at or above .08 g/dL. An indication of alcohol presence may give the officer probable cause to request further examination with a standard field sobriety test, or an EBT or PBT/ASD. Extensive research has shown that PAS scores are strong predictors of driver BAC status, making them effective alcohol-impaired-driving countermeasures. The cost for PAS units can range from \$300 to \$700 apiece and implementation can be immediate if officers are trained in their use and maintenance. Officers may be resistant to using PAS devices because they require officers to be closer to drivers than they prefer. Also, some officers believe they can detect alcohol odor accurately without PAS device assistance.

Other Devices

Personal breath-testing devices are personal-use portable breath alcohol testing devices used for estimating BAC from breath samples. It is important to note that these devices



U.S. Department of Transportation
National Highway Traffic Safety Administration
 1200 New Jersey Avenue SE
 Washington, DC 20590

are **not** used by law enforcement and they do **not** meet NHTSA's Model Specifications. Among their limitations is the requirement of active use and engagement, which provides only point-in-time BAC-level estimates. This is problematic if someone's BAC is rising but the device indicates they are below the illegal per se limit, leading them to drive.

Calibrating Units for Breath Alcohol Testers are important instruments to ensure the accuracy of breath testing devices by assessing and adjusting the internal settings of the device to a predetermined standard. Specifications for performance criteria and methods of testing have been established for testing of calibrating units that provide known concentrations of ethanol vapor for the calibration or calibration checks of breath alcohol testers.

Conclusion

Alcohol measurement devices are evidence-based, strongly supported, and widely used countermeasures to address alcohol-impaired driving. Depending on various factors, such as the needs of the law enforcement agency and the cost to purchase and maintain them, several options are available that meet NHTSA's Model Specifications, including evidentiary devices and preliminary devices. Additionally, passive sensors, although not among the devices that meet NHTSA Model Specifications, are still reliable and effective tools for law enforcement in detecting alcohol and predicting drivers' BAC status. Ultimately, law enforcement use of breath test devices reduces alcohol-impaired driving and subsequent injuries and fatalities. For more information, see NHTSA's *Countermeasures That Work*, or for details on specific devices and calibration units that meet NHTSA Model Specifications, see NHTSA's *Conforming Products Lists* at www.nhtsa.gov/drunk-driving/alcohol-measurement-devices.

References

Venkatraman, V., Richard, C. M., & Magee, K. (2021, July). *Countermeasures that work: A highway safety countermeasures guide for State Highway Safety Offices*, 10th edition (Report No. DOT HS 813 097). National Highway Traffic Safety Administration. www.nhtsa.gov/sites/nhtsa.gov/files/2021-09/15100_Countermeasures10th_080621_v5_tag.pdf

Suggested APA format citation for this report:

Smither, D. D. (2021, November). *Countermeasures that work: Alcohol measurement devices* (Traffic Tech. Report No. DOT HS 813 167). National Highway Traffic Safety Administration.

TRAFFIC TECH is a publication to disseminate information about traffic safety programs, including evaluations, innovative programs, and new publications. Feel free to copy it as you wish.