ASTM E2520-21 : E2520 Standard Practice for Measuring and Scoring Performance of Trace Explosive Chemical Detectors

Standard Practice for Measuring and Scoring Performance of Trace Explosive Chemical Detectors

Scope:

5.1 This practice may be used to accomplish several ends: to establish a worldwide frame of reference for terminology, metrics, and procedures for reliably determining trace detection performance of ETDs; as a demonstration by the vendor that the equipment is operating properly to a specified performance score; for a periodic verification by the user of detector performance after purchase; and as a generally-acceptable template adaptable by international agencies to specify performance requirements, analytes and dosing levels, background challenges, and operations.

5.2 It is expected that current ETD systems will exhibit wide ranges of performance across the diverse explosive types and compounds considered. As in previous versions, this practice establishes the minimum performance that is required for a detector to be considered effective in the detection of trace explosives. An explosives detector is considered to have “minimum acceptable performance” when it has attained a test score of at least 80.

Scope

1.1 This practice may be used for measuring, scoring, and improving the overall performance of detectors that alarm on traces of explosives on swabs. These explosive trace detectors (ETDs) may be based on, but are not limited to, chemical detection technologies such as ion mobility spectrometry (IMS) and mass spectrometry (MS).

1.2 This practice considers instrumental (post-sampling) trace detection performance, involving specific chemical analytes across eight types of explosive formulations in the presence of a standard background challenge material. This practice adapts Test Method E2677 for the evaluation of limit of detection, a combined metric of measurement sensitivity and repeatability, which requires ETDs to have numerical responses.

1.3 This practice considers the effective detection throughput of an ETD by factoring in the sampling rate, interrogated swab area, and estimated maintenance requirements during a typical eight hour shift.

1.4 This practice does not require, but places extra value on, the specific identification of targeted compounds and explosive formulations.

1.5 The functionality of multi-mode instruments (those that may be switched between detection of trace explosives, drugs of interest, chemical warfare agents, and other target compounds) may also be tested. A multi-mode instrument under test shall be set to the mode that optimizes operational conditions for

the detection of trace explosives. This practice requires the use of a single set of ETD operational settings for calculating a system test score based on the factors described in 1.2, 1.3, and 1.4. A minimum acceptable score is derived from criteria established in Practice E2520 – 07, and an example of such a test is presented in Appendix X1 (Example 2).

1.6 Intended Users—ETD developers and manufacturers, testing laboratories, and international agencies responsible for enabling effective deterrents to terrorism.

1.7 Actual explosives as test samples would be preferable, but standard explosive formulations are not widely available, nor are methods for depositing these quantitatively and realistically on swabs. This practice considers sixteen compounds that are available from commercial suppliers. This does not imply that only these sixteen are important to trace detection. Most ETDs are able to detect many other compounds, but these are either chemically similar (hence redundant) to the ones considered or are unavailable from commercial suppliers for reasons of stability and safety. Under typical laboratory practices, the sixteen compounds considered are safe to handle in the quantities used.

1.8 This practice is not intended to replace any current standard procedure employed by agencies to test performance of ETDs for specific applications. Those procedures may be more rigorous, use different compounds or actual explosive formulations, employ different or more realistic background challenges, and consider environmental sampling procedures and other operational variables.

1.9 This practice recommends one method for preparation of test swabs, pipetting, because this method is simple, reproducible, quantitative, documented, and applicable to most current detection technologies. Other methods, such as inkjet printing and dry transfer, may generate more realistic analyte distributions and particle sizes, but these methods are not widely available and less familiar. They may be used if the procedures are validated and documented properly.

1.10 With any deposition method, some compounds are difficult to present to the ETD inlet quantitatively due to volatility and loss during the swab preparation process. Problematic issues pertinent to this practice are identified along with recommended instructions.

1.11 Units—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.12 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.13 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International*

Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

IBDOCIED: ETD systems should never be run in Dual Mode (Explosives and Narcotics) as this increases the Desorber temperature and reduces detection of some explosives. ETD systems should only be used in the exploisve mode as this is the optimum temperature for detecting explosives.

Maintenance should always be done according to the manufacturers' requirements as maintenance ensures that the system is running correctly and will properly detect explosives. If you do not do the maintenance then the system will become contaminated and exploisve detection will be compromised.

Consumables and maintenance supplies should only be purchased from TSA/TSL approved vendors. Buying from the manufacture will be significantly more costly vs buying from TSA/TSL approved 3rd party vendors.

IMS systems only detect organic explosives and cannot detect any of the inorganic explosives. You cannot use these systems to "Clear" a item based on the system not detecting explosives.

To purchase TSA/TSL approved consumables: ETD Direct | Quality You Can Trust, Prices That Can't Be Beat

For ETD Training: svscountermeasurestraining.com/collections/security-countermeasures-training