

NON-DETONABLE TRAINING AIDS FOR EXPLOSIVES DETECTION CANINES

Non-detonable training aids (TAs) are specialized tools used in training explosives detection canines (EDCs) to recognize various explosives and explosives-related threats and alert their handlers to the presence of those materials. Non-detonable TAs are crucial for security and law enforcement agencies as well as military organizations where EDCs play a vital role in security and anti-terrorism efforts. Non-detonable TAs contribute to the success and proficiency of working canines across various fields while removing risks associated with handling live explosives during training. Non-detonable TAs fall under the Authorized Equipment List reference number 07ED-01-DOGS, titled “Canines, Explosive Detecting.”

Overview

Non-detonable TAs are comprised of materials that incorporate actual explosives in their construction or process them in a way that ensures safety. Non-detonable TAs are meant to create realistic and effective detection targets for EDCs, as they are crafted to produce the scent characteristics of genuine explosive materials while removing the possibility of detonation. Available odor options for non-detonable TAs include formulated explosives, both high and low explosives, oxidizers, peroxides, and nitrate or chlorate salts [1]. This extensive assortment of odors allows trainers to select TAs that align with their distinct training objectives.

Non-detonable TAs achieve their non-explosive characteristics through various methods. One strategy involves mixing the active explosive substance or formulation with an inert filler, thus preventing propagation of detonation. Alternatively, some TAs employ techniques to trap and contain the vapor produced by the explosive material alongside non-explosive components, significantly reducing their overall hazard. Another approach is to encapsulate the genuine explosive material within a protective medium such as polymer, silica or petroleum. Encapsulation effectively isolates the energetic material from external influences, enhancing safety and preventing unintentional detonation. Regardless of the manufacturing method chosen, it is important to consider if there is potential for introducing extraneous odors that could interfere with the training process.

When procuring non-detonable TAs, purchasers should consider the specific training need, available explosive odors, physical form and design, availability of blank TAs, storage conditions, work time and shelf life.



Figure 1. Explosives Detection Canines
Image credit: DHS

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) program to inform emergency responder equipment selection and procurement decisions.

Under the Science and Technology Directorate, the National Urban Security Technology Laboratory (NUSTL) manages the SAVER program, which – with the participation of emergency responders – performs objective operational assessments of commercially available equipment.

SAVER knowledge products provide information about equipment that falls under the DHS Authorized Equipment List (AEL) categories and focus on two questions for the responder community: “What equipment is available?” and “How does it perform?”

To explore the full library, visit SAVER online at www.dhs.gov/science-and-technology/saver-documents-library.

For additional information on the SAVER program, email NUSTL at NUSTL@hq.dhs.gov.



Form Factor

Non-detonable TAs are available in a diverse range of physical forms, encompassing powders, solid objects and various alternatives [1]. The physical form of the TA impacts its appearance, ease of use and practicality. Form factor should be carefully considered in order to provide effectiveness across a diverse range of training locations and scenarios.

Blank TAs

Blank TAs are manufactured in the same way as target odor TAs, sharing identical inert elements and packaging while excluding active odor components. Having access to blank TAs is crucial for training EDCs to ignore extraneous odors that might be present in the TAs. Blank TAs are not typically included with the purchase of target odor TAs therefore, trainers should determine the availability of blank TAs when making procurement selections.

Storage Conditions

Storage conditions detail the requirements essential for proper preservation of the TA. Aligning storage with the recommended conditions is crucial for reducing both the degradation of the TA and cross-contamination. Storing TAs outside optimal conditions can decrease both work time and shelf life and lead to the introduction of extraneous odors. To minimize the risk of cross-contamination, users should be mindful when storing multiple TA types together. Additionally, transport and confinement requirements associated with traditional explosive TAs are not applicable to non-detonable TAs.

Work time

Work time refers to how long a TA maintains its intended scent profile when actively used for training. Work time varies widely across TA products (e.g., 8 hours–120 days). It also denotes how many times the TA can be used for training sessions (i.e., single or multi-use). TA longevity influences TA replacement cycle and cost.



Figure 2. Examples of Non-Detonable TAs

Image credit: Gallant Tech, Polymath Interscience, Precision Explosives, Signature Science, Tripwire Operations Group, K9 NESTT, and Ray Allen Manufacturing

Shelf Life

Shelf life is the period during which a TA can be stored unopened in the original manufacturer's packaging without substantial degradation in quality, safety or effectiveness, thus maintaining its suitability for use. TA shelf life can range from months to several years. Over time, the chemical composition of the TA can change, making it less effective. Some manufacturers may provide an expiration date along with a specified shelf life. Monitoring TA shelf life is an integral part of TA management, contributing to the consistency and efficacy of canine training programs.

Applicable Standards

Standards tailored exclusively to canine TAs are currently limited; however, the [Dogs and Sensors Subcommittee](#), within the National Institute of Standards and Technology's Organization of Scientific Area Committees for Forensic Science, has directed its focus towards defining standards and guidelines to support the canine detection community [2].

References

- [1] National Urban Security Technology Laboratory, U.S. Department of Homeland Security, "Non-Detonable Training Aids for Explosives Detection Canines Markey Survey Report," 2024.
- [2] National Institute of Standards and Technology, "Dogs & Sensors Subcommittee," 3 November 2023. [Online]. Available: <https://www.nist.gov/organization-scientific-area-committees-forensic-science/dogs-sensors-subcommittee>. [Accessed 19 December 2023].