Homeland Security
Science and Technology

TechNote

U.S. Department of Homeland Security

SAVER
System Assessment and Validation for Emergency Responders

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercially available equipment and systems, and develops knowledge products that provide relevant equipment information to the emergency responder community.

SAVER Program knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?" These knowledge products are shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. This TechNote was prepared for the SAVER Program by the Space and Naval Warfare Systems Center Atlantic.

SPAWAR
Systems Center ATLANTIC

For more information on this and other technologies, contact the SAVER Program by e-mail or visit the SAVER website.

E-mail: saver@hq.dhs.gov
Website: www.firstresponder.gov/SAVER

Total Containment Vessels

Total containment vessels (TCVs) are fully enclosed containers designed to safely secure, transport, and test explosive or chemical devices. TCVs are used by emergency responders as mitigation solutions to help protect people, property, and the environment from primary and secondary fragmentation and gases that generally result from the detonation of an explosive device. Once the suspect object is contained in the chamber, the surrounding area is protected from blast effects of the explosive device, up to the explosive rating of the chamber.

This TechNote focuses on TCVs that are gas-tight, spherical, have a diameter of approximately 3 to 6 feet, and are transportable by a trailer or truck.

TCV Technology Overview

A TCV has three basic components: the core chamber, frame, and control console. The core chamber is typically spherical and made of high-strength steel from 1 to 1.5 inches thick. The chamber has an access door, an internal tray for holding the suspect object, and a yoke system, which holds the access door closed. Some TCVs have a protective barrier of lead located between two layers of steel as a protective measure from radioactive materials, such as dirty bombs. All chambers are rated for a maximum internal blast pressure, which is called the trinitrotoluene (TNT) equivalent. The TNT equivalent for these vessels, typically measured in kilograms (kg), can range from 2 to 10 kg.

Figure 1. NABCO 64-SCS-GT

Image courtesy of NABCO

The size and location of the chamber's access door is an important consideration. If the door opening is too small, the suspect object may not fit inside. If the door is in an awkward location, such as the top of the chamber, it may be difficult to access. Most chambers have side-loading openings ranging from 18 to 36 inches in diameter. Some manufacturers offer a maximum opening on the largest diameter (Figure 2).

Figure 2. Core Chamber

Image courtesy of Dynasafe Group

An internal tray mechanism inside the chamber enables smooth loading and unloading of suspect objects. The object remains in the tray during transport. The gas-tight capability of some TCVs is achieved by equipping the chamber door with a yoke system consisting of two half-rings which tightly clamp together to hold the access door in a closed position.

The yoke is powered by an electric, hydraulic, or pneumatic mechanism. The door and yoke are equipped with multiple rubber O-rings, which form a pressurized seal and are resistant to high temperature.

The containment vessel is mounted on a steel or aluminum frame for support. The frame can also be used to support other items such as an actuator button for robot operation of the internal tray, door, and yoke system. The control console houses the mechanics and controls for the operation of the TCV, such as opening and closing of the chamber access door and moving the internal tray in and out of the chamber. The bomb technician can remain at a safe distance from the chamber by using a tethered pendant, a wireless remote control, or an explosive ordnance disposal robot.

Applications

Containment vessels have many applications in law enforcement, security, and transportation for safely securing, transporting, and testing explosive or chemical devices. Many government and commercial office buildings, including embassies, post offices, nuclear power plants, and transportation facilities are prime targets for bomb threats. The TCV is designed to contain the bomb while being transported to an area where it can be rendered safe. Terrorist activities continue to escalate worldwide and TCVs are a great benefit to meet bomb security needs.

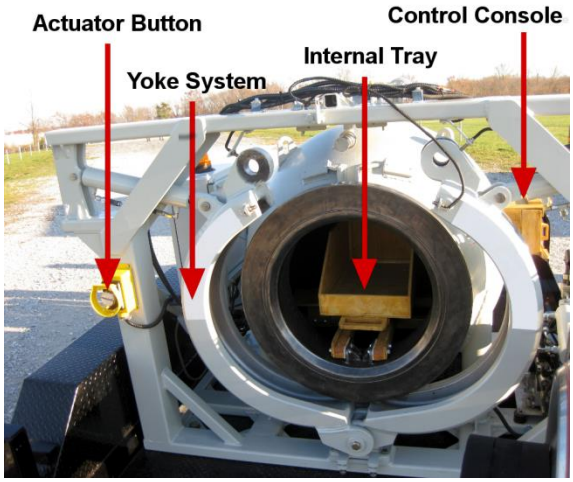

Figure 3. TCV Core Chamber

Image courtesy of JAKUSZ

Resources

State, local, and Federal grants are available that may provide funding for the purchase of a TCV. The Department of Homeland Security (DHS) has a program that is comprised of three interconnected grant programs: the State Homeland Security Program (SHSP), the Urban Areas Security Initiative (UASI), and Operation Stonegarden (OPSG). These grant programs enhance the local governments' preparedness capabilities in the areas of prevention, protection, mitigation, response, and recovery. These programs fund an array of activities, which include planning, organization, equipment purchase, training, exercises, and management and administration (www.fema.gov/fy-2013-homeland-security-grant-program-hsgp-0).

The Department of Health and Human Services (HHS) has developed a website where agencies can find and apply for federal grants online. The website provides an online system with search, registration, application, and tracking capabilities. All discretionary grants offered by over 20 federal grant-making agencies can be found on the website at www.grants.gov/web/grants/home.html.

The Defense Logistics Agency (DLA) has a program called DLA Disposition Services that transitions unused equipment from military to public service use. For example, in 2012, the U.S. Marine Corps transferred an older model TCV through the DLA Disposition Services program to the Arizona Department of Public Safety bomb squad. This was done at no cost to the recipient (www.dispositionservices.dla.mil/).

References

Previously published SAVER documents that provide more information about TCVs and other bomb containment equipment are: *Total Containment Vessels Market Survey Report; Blast Resistant Trash Receptacles Market Survey Report; Blast Resistant Trash Receptacles TechNote;* and *Test Results of Blast Resistant Trash Receptacles*. These documents can be found on the SAVER website at www.firstresponder.gov/SAVER.