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 & Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL).

Information provided by the SAVER Program will be shared nationally with the responder community, providing a life-saving and cost-saving asset to DHS, as well as federal, state, and local responders.

The SAVER Program is supported by a network of technical agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

For more information on this and other technologies, please see the SAVER website or contact the SAVER Program Support Office.

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SPAWAR Systems Center ATLANTIC

Metal Detectors for Personnel Screening

Metal detectors provide the responder community with an essential tool to screen individuals that may be carrying weapons or contraband that contain metallic components. Available in walk-through and handheld models, metal detectors are commonly used at checkpoints in airports, schools, courthouses, prisons, and military installations.

Walk-through metal detectors can be designed for either indoor or outdoor use. Outdoor models are weatherproof and are often used at temporary venues, such as concerts or sporting events. Indoor models are typically installed at a fixed location. They can, however, be moved if needed.

Handheld metal detectors, also known as security wands, are often used at checkpoints in conjunction with walk-through metal detectors; the handheld model provides focused screening when the alarm in the walk-through metal detector has been triggered.

Personnel Screening with a Handheld and Walk-Through Metal Detector

Although handheld metal detectors are more commonly used as a secondary means of screening, they can be used as a primary screening device.

Handheld metal detectors are weatherproof, easy to transport, and less expensive than walk-through metal detectors. Walk-through models range in price from $2,000 to over $10,000. Handheld models range in price from $100 to over $400.

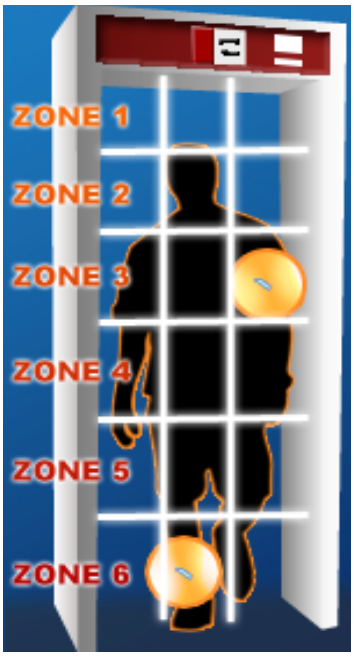
Technology Overview

Metal detectors use electromagnetic fields to passively or actively detect the presence of metallic objects. Passive detection measures the changes in the Earth's magnetic field caused by an object. In active detection, a metal detector generates a time-varying magnetic field, either in the archway of a walk-through model or in the space near a handheld model, to determine the amount of metal present in an object.

Metals such as iron, nickel and cobalt are detected by passive and active metal detectors. Other metals, such as copper, brass and aluminum, are detected only by active means.

Walk-through metal detectors are categorized as single-zone or multiple-zone. Multiple-zone technology is replacing single-zone technology, which has been in use for more than 30 years.

In multiple-zone metal detectors, the archway is divided into horizontal zones. The sensitivity of each zone can be adjusted, increasing the ability of the metal detector to differentiate between weapons and metal items that do not pose a danger, such as keys and coins. The horizontal zones can be further divided into vertical sectors. This makes it possible to identify the approximate location of a weapon or other contraband.



Multi-Zone Metal Detector

There are several design trends for walk-through metal detectors. One is the integration of walk-through metal detectors as a component in security systems. This integration allows operators to remotely monitor metal detectors and lock access doors if an alarm is triggered. Another design trend is the inclusion of a digital camera feature that captures images of the individuals that walk through the metal detector. This feature can aid law enforcement by assisting in the identification of people who flee a security checkpoint.

Considerations

Some factors to consider when purchasing or implementing a metal detector include power requirements, sensitivity settings, and daily testing.

A standard 110 volt or 220 volt outlet provides power to indoor and outdoor walk-through metal detectors. A rechargeable battery pack is typically included with an outdoor walk-through metal detector in the event that a standard outlet is not available at the checkpoint location. Battery packs typically provide power for up to three days of continuous operation. Handheld metal detectors can provide up to 80 hours of continuous operation and can be powered by either 9-volt (V) batteries or rechargeable battery packs.

To accommodate for existing background electromagnetic fields, the majority of metal detectors calibrate automatically when powered-up. In addition, the sensitivity of most metal detectors is adjustable to minimize the number of false and nuisance alarms. As the number of false or nuisance alarms increases, throughput, defined as the number of people scanned in a given period of time, decreases. False alarms may be caused by objects in the environment that can emit or reflect electromagnetic fields. Fluorescent lights, computer monitors, and structural steel are some examples of objects that can cause interference. Manufacturers have incorporated filtering hardware and software that suppress or compensate for electromagnetic interference. If necessary, shifting the location of a checkpoint can reduce the effects of interference from certain sources such as structural steel in the floors and walls.

Personnel should be properly trained in the operation and testing of metal detectors and the metal detectors should be tested daily before use. Walk-through metal detector testing is done by carrying a test object, ranging in size from a microprocessor chip to a large handgun, through the metal detector several times. If a test object is not detected, the operator should adjust the sensitivity level of the metal detector. Using the lowest sensitivity setting that consistently detects a test object will decrease false and nuisance alarms.

The process for testing a handheld model is similar. Instead of carrying a test object through an archway, however, the test object is scanned at a certain distance from the handheld metal detector to ensure consistent detection.

Concerns

Electromagnetic emissions from active metal detectors may cause interference with medical devices such as pacemakers or defibrillators. Although this is rare, responders should be aware of the medical conditions that interference may cause.

Resources

- *Handheld Metal Detectors for Use in Concealed Weapon and Contraband Detection* (NIJ Standard 0602.02)
  http://www.ncjrs.gov/pdffiles1/nij/200330.pdf
- *Walk-Through Metal Detectors for Use in Concealed Weapon and Contraband Detection* (NIJ Standard 0601.02)
  http://www.ncjrs.gov/pdffiles1/nij/193510.pdf