



Designation: C 1238 – 97

Standard Guide for Installation of Walk-Through Metal Detectors¹

This standard is issued under the fixed designation C 1238; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 Some facilities require that personnel entering designated areas be screened for concealed weapons and other metallic materials. Also, personnel exiting designated areas are often screened for metallic shielding material and other types of metallic contraband. Walk-through metal detectors are widely used to implement these requirements. This guide describes various elements to be considered when planning to install walk-through metal detectors.

1.2 This guide is not intended to set performance levels, nor is it intended to limit or constrain operational technologies.

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 NRC Document:

NUREG-1329 Entry/Exit Control At Fuel Fabrication Facilities Using or Possessing Formula Quantities of Strategic Special Nuclear Material²

2.2 U.S. Government Documents:

DOE 5632.2A Physical Protection of Special Nuclear Materials and Vital Equipment, February 9, 1988³

DOE 5633.3 Control and Accountability of Nuclear Materials, February 3, 1988³

2.3 National Fire Protection Associations (NPA) Life Safety Code Handbook:

NFPA-101-1988, Chapter 28, Industrial Occupancy⁴

2.4 ANSI Standard:

Z41.1-PT-1983 Class 50 and 75—For Non-ferrous and Ferrous Safety Footwear⁵

2.5 National Institute of Law Enforcement and Criminal

Justice (NILECJ) Standard:

0601.00 For Design, Performance, and Allowable Magnetic Field Strength³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *continuous-wave-type metal detector*—a system generally employing one or more pairs of closely coupled coils. One coil is electrically energized to establish an electromagnetic field; the other detects disturbances in that field. In operation, the coils are configured so that the person or object being screened passes through the field. When metal passes through the field, the field is modified by the magnetic and electrical properties of the metal. Any change in the field is sensed by measuring one or more of many possible parameters, including mutual inductance, power loss, phase shift, frequency shift, permeability, etc.

3.1.2 *nuisance alarm*—an alarm not caused by a weapon or shielding material but by other causes such as outside interference or other operationally or environmentally induced stimulus. In practice, these alarms are a nuisance because they are not obvious and must be investigated and the cause eliminated.

3.1.3 *pulse-wave-type metal detectors*—a system in which brief current pulses are generated in transmitter coils when they are switched on. The electromagnetic field generated by these pulses induces eddy currents in metallic objects in the field. The eddy currents decay when the transmitter coils are shut off. The decay of the eddy currents produces secondary voltages in the receiver coils, which are switched on only when the transmitter coils are switched off. The voltages induced in the receiver coils are processed and compared against a bias or background level.

3.1.4 *shielding*—a metallic material configured as a credible gamma-radiation shield for special nuclear materials (SNM).

3.1.5 *throughput*—the actual rate at which a metal detector and system can screen personnel for a given application.

3.1.6 *walk-through metal detector*—a free-standing screening device having an electromagnetic field within its portal structure (aperture) for detecting metallic objects, including some nuclear shielding materials, carried by persons walking through the aperture.

3.1.7 *weapon*—a device intended to do damage to personnel or equipment without intentionally harming the attacker, but requiring the attacker to physically activate or use the device.

¹ This guide is under the jurisdiction of ASTM Committee C-26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.12 on Safeguard Applications.

Current edition approved Dec. 10, 1997. Published May 1998.

² Available from the U.S. Nuclear Regulatory Commission, Washington, DC 20555.

³ Available from U.S. Government Printing Office, Washington, DC 20402.

⁴ National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

⁵ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.