



Designation: F3566 – 22

Standard Performance Specifications and Test Methods for Walk-Through Metal Detectors Used in Safety and Security¹

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1. Scope

1.1 This standard applies to all walk-through metal detectors that are used to find metal contraband concealed or hidden on people.

1.2 This standard describes baseline acceptable technical performance requirements, which includes metal object detection performance, safety (electrical, mechanical, fire), electromagnetic compatibility, environmental conditions and ranges, and mechanical durability. The requirements for metal detection performance are unique and, therefore, test methods for these parameters are provided, including the design of test objects. An agency or organization using this standard is encouraged to add their unique operationally-based requirements to those requirements listed in this baseline technical performance standard.

NOTE 1—For ease of use, steps of test procedures in this standard are indicated by numbered lists.

1.3 This standard describes the use of threat object exemplars, instead of actual threat objects, to test the detection performance of walk-through metal detectors.

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

1.5 *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.*

1.6 *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.*

¹ These performance specifications are under the jurisdiction of ASTM Committee F12 on Security Systems and Equipment and are the direct responsibility of Subcommittee F12.60 on Controlled Access Security, Search, and Screening Equipment.

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2. Referenced Documents

2.1 ANSI Standards:²

ANSI S1.4 Part 1: R19 Edition Sound Level Meters - Part 1: Specifications

ANSI/NEMA WD 6 American National Standards Institute/ National Electrical Manufacturing Association, Wiring Devices - Dimensional Specifications

2.2 CIE Standards:³

ISO/CIE 23539 Photometry — The CIE System of Physical Photometry

2.3 IEC Standards:⁴

CISPR 16-2-1 + AMD1 Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements

CISPR 16-2-3 Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements

IEC 60068-2-27 Basic Environmental Testing Procedures, Part 2-27: Tests – Test Ea and guidance: Shock

IEC 60068-2-30 Environmental Testing, Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)

IEC 60529 Ed 2 Degrees of Protection Provided by Enclosures (IP Code)

IEC 61000-4-2 Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

IEC 61000-4-3 Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test

IEC 61000-4-4 Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

IEC 61000-4-5 Ed 3.1 Electromagnetic compatibility (EMC)

² Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

³ Available from U.S. National Committee of the CIE (International Commission on Illumination), C/o Alan Laird Lewis, 282 E. Riding, Carlisle, MA 01741, <http://www.cie-usnc.org>.

⁴ Available from International Electrotechnical Commission (IEC), 3, rue de Varembe, 1st floor, P.O. Box 131, CH-1211, Geneva 20, Switzerland, <https://www.iec.ch>.

- Part 4-5: Testing and measurement techniques - Surge immunity test
- IEC 61000-4-6** Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
- IEC 61000-4-8** Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
- IEC 61000-4-11** Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests
- IEC 61000-6-1** Electromagnetic compatibility - Generic Immunity Standard, Part 1: Residential, Commercial, and Light Industry
- IEC 61000-6-3** Electromagnetic compatibility - Generic Emission - Emission Standard for Residential, Commercial, and Light-Industrial Environments
- IEC 61010-1+AMD1** Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
- IEC 623691** Evaluation of human exposure to electromagnetic fields from short range devices (SRDs) in various applications over the frequency range 0 GHz to 300 GHz - Part 1: Fields produced by devices used for electronic article surveillance, radio frequency identification and similar systems
- 2.4 *IEEE Standards:*⁵
- IEEE C95.1** Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
- IEEE C95.6** Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0–3 kHz
- 2.5 *ISO Standards:*⁶
- ISO 10012** Measurement Management Systems — Requirements for measurement processes and measuring equipment
- ISO 14117** Active implantable medical devices — Electromagnetic compatibility — EMC test protocols for implantable cardiac pacemakers, implantable cardioverter defibrillators, and cardiac resynchronization devices
- ISO 14708-1** Implants for surgery — Active implantable medical devices — Part 1: General requirements for safety, marking and for information to be provided by the manufacturer
- ISO 14708-2** Implants for surgery — Active implantable medical devices — Part 2: Cardiac pacemakers
- ISO 14708-3** Implants for surgery — Active implantable medical devices — Part 3: Implantable neurostimulators
- ISO 14708-4** Implants for surgery — Active implantable medical devices — Part 4: Implantable infusion pumps
- ISO 14708-5** Implants for surgery — Active implantable medical devices — Part 5: Circulatory support devices

- ISO 14708-6** Implants for surgery — Active implantable medical devices — Part 6: Particular requirements for active implantable medical devices intended to treat tachyarrhythmia (including implantable defibrillators)
- ISO 14708-7** Implants for surgery — Active implantable medical devices — Part 7: Particular requirements for cochlear implant system
- ISO 17025** General Requirements for the Competence of Testing and Calibration Laboratories
- 2.6 *Military Standards:*⁷
- MIL-STD-810H: Method 501.7** Military Standard, Test Method Standard for Environmental Engineering Considerations and Laboratory Tests, Method 501.7, High Temperature
- MIL-STD-810H: Method 502.7** Military Standard, Test Method Standard for Environmental Engineering Considerations and Laboratory Tests, Method 502.7, Low Temperature

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *alarm, n*—an indication that informs the operator of an event, such as metal detection or a walk-through metal detector (WTMD) status change.

3.1.2 *body simulant, n*—a material engineered to simulate the average electrical conductivity and magnetic permeability of the human body; the average electrical conductivity is $0.8 \text{ S/m} \pm 0.2 \text{ S/m}$ and the average magnetic permeability is $1.26 \times 10^{-6} \text{ H/m} \pm 5 \times 10^{-7} \text{ H/m}$.

3.1.3 *clean test subject, n*—a person who carries no electrically conductive or magnetizable objects such as metallic belt buckles, metal buttons, cardiac pacemaker, coins, metal-frame eyeglasses, hearing aid, jewelry, keys, pens and pencils, shoes with metal arches or supports, metallic surgical implants, undergarment support metal, metal zippers, or similar items, which would significantly alter the signal produced when the person carries a test object; the height and mass of the clean test subject should be $180 \text{ cm} \pm 5 \text{ cm}$ and $80 \text{ kg} \pm 10 \text{ kg}$.

3.1.3.1 *Discussion*—Alternative: A clean test subject may be replaced by a human body simulator that approximates the mass and mass distribution of an average adult male. See 5.4.1.11.

3.1.4 *detection, n*—the discovery or finding of a metallic object; the detection of a metallic object is typically transmitted to the operator by some type of alarm, typically a visual or audible alarm (see 4.11.2).

3.1.5 *detection signal, n*—the electrical signal generated by the sensor or sensor circuit of the WTMD and caused by a metallic object interacting with the magnetic field generated by the WTMD; the detection signal is the basis on which an alarm is activated.

3.1.6 *detector platform, n*—a nonconductive, nonmagnetic platform on which the WTMD rests; the detector mount locates

⁵ Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., Piscataway, NJ 08854-4141, <http://www.ieee.org>.

⁶ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.

⁷ Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.