

# INTERNATIONAL STANDARD

**Active millimetre-wave systems for security screening of humans – General requirements**

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IEC Secretariat  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ACTIVE MILLIMETRE-WAVE SYSTEMS FOR SECURITY  
SCREENING OF HUMANS – GENERAL REQUIREMENTS**

## FOREWORD

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The text of this International Standard is based on the following documents:

Draft	Report on voting
45B/1064/FDIS	45B/1072/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

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# ACTIVE MILLIMETRE-WAVE SYSTEMS FOR SECURITY SCREENING OF HUMANS – GENERAL REQUIREMENTS

## 1 Scope

This document applies to security screening systems that utilize active millimetre-wave (MMW) imaging to inspect persons who are not inside vehicles, containers, or enclosures. Specifically, this document applies to systems used to detect objects carried on the body of the individual being screened at a security checkpoint. This document applies to systems that screen people using radiation in the range between 3 GHz and 150 GHz (100 mm to 2 mm).

This document specifies the technical requirements, test methods, and signage of the active MMW systems for security screening of humans.

This document does not specify minimum or baseline requirements of image quality, automated threat recognition (ATR) performance, nor does it specify a minimum detection time.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60204-1:2016, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60204-1:2016/AMD1:2021

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60529:1989/AMD1:1999

IEC 60529:1989/AMD2:2013

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2020, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*



IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*  
IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:2023, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-11:2020, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

IEC 61000-6-1:2016, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential, commercial and light-industrial environments*

IEC 61000-6-3:2020, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for equipment in residential environments*

IEC 61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*  
IEC 61010-1:2010/AMD1:2016

ISO 3744:2010, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure-Engineering methods for an essentially free field over a reflecting plane*

ISO/IEC 18033-3:2010, *Information technology – Security techniques – Encryption algorithms – Part 3: Block ciphers*  
ISO/IEC 18033-3:2010/AMD1:2021

IEEE Std. C95.1-2019, *Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 kHz to 300 GHz*

<https://standards.iteh.ai/catalog/standards/iec/3ce4515f-3b4d-4bf8-93e1-3a340e064aee/iec-63391-2024>

IEEE N42.59, *Standard for Measuring the Imaging Performance of Active Millimeter-Wave Systems for Security Screening of Humans* (balloted March 2024)

ICNIRP *Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz)*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

#### 3.1

##### **automated target recognition**

##### **ATR**

automated software or algorithms used for anomaly detection, which includes threats, but not necessarily identification of particular objects or threats

Note 1 to entry: A MMW system with an ATR is designed to automatically indicate the location of the items carried by an inspected person.

**3.2****contrast resolution**

measure of the extent to which targets with similar reflectivity can be distinguished as having distinct grayscale values in a MMW image

**3.3****contrast scaling**

mapping of the reflected signal to the grayscale values in a MMW imaging system

**3.4****depth**

direction perpendicular to the y-axis and intersecting the centre of the imaging aperture

Note 1 to entry: Figure 4 defines the system axes.

**3.5****depth response**

full width at half maximum in the depth direction of the reflected signal that is obtained from imaging a thin, highly-reflective object using a MMW system

**3.6****detection**

action of finding and indicating the location of an item carried or concealed by an inspected person

Note 1 to entry: Only applies to systems with ATR.

**3.7****detection time**

time duration from the initiation of the scan to the display of the automatically-generated detection result

Note 1 to entry: For a system without ATR, detection time refers to the time duration from the initiation of the scan to the display of the acquired image.

**3.8****effective depth resolution**

measured spatial resolution in the depth direction

**3.9****false alarm**

alarm where no item is carried by an inspected person

Note 1 to entry: Only applies to systems with ATR.

**3.10****horizontal illumination coverage**

measure of the visible width of a vertical cylinder in the x-z plane in a MMW image

Note 1 to entry: Figure 4 defines the system axes.

**3.11****lateral resolution**

measure of the extent to which closely spaced objects can be separately distinguished in directions lateral to the plane of the test object

Note 1 to entry: The resolution criterion is a modulation transfer function (MTF) of at least 0,2 in an imaged test pattern.