INTERNATIONAL STANDARD

ISO/IEC 14443-1

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Identification cards — Contactless integrated circuit(s) cards — Proximity cards —

Part 1: Physical characteristics

Cartes d'identification — Cartes à circuit(s) intégré(s) sans contacts — Cartes de proximité —

Partie 1: Caractéristiques physiques

Reference number
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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 14443 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 14443-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Identification cards and related devices*.

ISO/IEC 14443 consists of the following parts, under the general title *Identification cards — Contactless integrated circuit(s) cards — Proximity cards*:

— *Part 1: Physical characteristics*

— *Part 2: Radio frequency interface power and signal interface*

— *Part 3: Initialization and anticollision*

— *Part 4: Transmission protocol*

Annexes A and B of this part of ISO/IEC 14443 are for information only.

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Introduction

ISO/IEC 14443 is one of a series of International Standards describing the parameters for identification cards as defined in ISO/IEC 7810 and the use of such cards for international interchange.

This part of ISO/IEC 14443 describes the physical characteristics of proximity cards.

This part of ISO/IEC 14443 does not preclude the incorporation of other standard technologies on the card, such as those referenced in the informative annex A.

Contactless card Standards cover a variety of types as embodied in ISO/IEC 10536 (Close-coupled cards), ISO/IEC 14443 (Proximity cards), ISO/IEC 15693 (Vicinity cards). These are intended for operation when very near, nearby and at a longer distance from associated coupling devices respectively.

ISO/IEC 14443 is intended to allow operation of Proximity cards in the presence of other contactless cards conforming to ISO/IEC 10536 and ISO/IEC 15693 standards.

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Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 1: Physical characteristics

1 Scope

This part of ISO/IEC 14443 specifies the physical characteristics of proximity cards (PICC). It applies to identification cards of the card type ID-1 operating in proximity of a coupling device.

This part of ISO/IEC 14443 shall be used in conjunction with later parts of ISO/IEC 14443.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 14443. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 14443 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 7810, *Identification cards - Physical characteristics.*

ISO/IEC 10373, *Identification cards - Test methods.*

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

3 Terms and definitions

For the purposes of this part of ISO/IEC 14443, the following definitions apply.

3.1
integrated circuit(s) (IC)
Electronic component(s) designed to perform processing and/or memory functions.

3.2
contactless
Pertaining to the achievement of signal exchange with and supplying power to the card without the use of galvanic elements (i.e., the absence of an ohmic path from the external interfacing equipment to the integrated circuit(s) contained within the card).

3.3
contactless integrated circuit(s) card
A card of the card type ID-1 (as specified in ISO/IEC 7810) into which integrated circuit(s) have been placed and in which communication to such integrated circuit(s) is done in a contactless manner.

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3.4
proximity card (PICC)
A card of the card type ID-1 into which integrated circuit(s) and coupling means have been placed and in which communication to such integrated circuit(s) is done by inductive coupling in proximity of a coupling device.

3.5
proximity coupling device (PCD)
The reader/writer device that uses inductive coupling to provide power to the PICC and also to control the data exchange with the PICC.

4 Physical characteristics

4.1 General

The PICC shall have physical characteristics according to the requirements for the card type ID-1 specified in ISO/IEC 7810.

4.2 Dimensions

The nominal dimensions of the PICC shall be as for the card type ID-1 specified in ISO/IEC 7810.

4.3 Additional characteristics

4.3.1 Ultra-violet light

This part of the ISO/IEC 14443 excludes requirements for protection of the PICC against the effects of ultra-violet light levels greater than those in ordinary daylight at sea-level. Where greater protection is needed it shall be the responsibility of the card manufacturer to provide it and to state the tolerable level of ultra-violet light.

4.3.2 X-rays

The PICC shall continue to operate as intended after exposure of either face to medium-energy X-radiation, with energy in the range of 70 keV to 140 keV, of a cumulative dose of 0,1 Gy per year.

NOTE This corresponds to approximately twice the maximum acceptable dose to which humans may be exposed annually.

4.3.3 Dynamic bending stress

The PICC shall continue to operate as intended after testing in accordance with the test methods described in ISO/IEC 10373 where the maximum deflections about the short and long cards axes are h_wA = 20 mm and h_wB = 10 mm.

4.3.4 Dynamic torsional stress

The PICC shall continue to operate as intended after testing in accordance with the test methods described in ISO/IEC 10373 where the maximum angle of rotation is $\alpha = 15°$.

4.3.5 Alternating magnetic fields

The PICC shall continue to operate as intended after exposure, in any orientation, to a magnetic field with an average level given in the Table 1. The averaging time is 6 minutes and the maximum rms level of the magnetic field is limited to 33 times the average level.

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Table 1 — Magnetic Field Strength vs Frequency

Frequency Range (MHz)	Average Magnetic Field Strength (A/m rms)
0,3 - 3,0	1,63
3,0 - 30	4,89/*f*
30 - 300	0,163

f : frequency in MHz

Additionally, the PICC shall continue to operate as intended after continuous exposure to a magnetic field of an average level of 10 A/m rms at 13,56 MHz. The averaging time is 30 seconds and the maximum level of the magnetic field is limited to 12 A/m rms.

4.3.6 Alternating electric field

The PICC shall continue to operate as intended after exposure, in any orientation, to an electric field with an average level given in the Table 2. The averaging time is 6 minutes and the maximum rms level of the electric field is limited to 33 times the average level.

Table 2 — Electric Field Strength vs Frequency

Frequency Range (MHz)	Average Electric Field Strength (V/m rms)
0,3 - 3,0	614
3,0 - 30	1842/*f*
30 - 300	61,4

f: frequency in MHz

4.3.7 Static electricity

The PICC shall continue to operate as intended after testing in accordance with the test methods described in ISO/IEC 10373 (referring to IEC 61000-4-2:1995), where the test voltage is 6 kV.

4.3.8 Static magnetic field

The PICC shall continue to operate as intended after exposure to a static 640 kA/m magnetic field.

WARNING — The data content of a magnetic stripe might be erased by such a field.

4.3.9 Operating temperature

The PICC shall operate as intended over an ambient temperature range of 0 °C to 50 °C.

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Annex A
(informative)

Standards compatibility

This part of ISO/IEC 14443 does not preclude the addition of other existing card standards on the PICC, such as those listed as follows:

ISO/IEC 7811, *Identification cards - Recording technique.*

ISO/IEC 7812, *Identification cards - Identification of issuers.*

ISO/IEC 7813, *Identification cards - Financial transaction cards.*

ISO/IEC 7816, *Identification cards - Integrated circuit(s) cards with contacts.*

ISO/IEC 10536, *Identification cards - Contactless integrated circuit(s) cards - Close-coupled cards.*

ISO/IEC 15693, *Identification cards - Contactless integrated circuit(s) cards - Vicinity cards.*

WARNING — Restrictions may apply to embossing of the PICC.

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Annex B
(informative)

Surface quality for printing

Where there is a requirement to customise the PICC after the manufacturing process by overprinting, care should be taken to ensure the areas used for printing are of sufficient quality appropriate to the printing technique or printer used.

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