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Cards and security devices for personal identification — Test methods —

Part 1: General characteristics

*Cartes et dispositifs de sécurité pour l'identification personnelle — Méthodes d'essai —
Partie 1: Caractéristiques générales*

ICS: 35.240.15

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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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and security devices for personal identification* (previously known as: *identification cards*).

This third edition cancels and replaces the second edition (ISO/IEC 10373-1:2006), of which it constitutes a major revision with the following changes.

- Inclusion of ICC tests from *ISO/IEC 10373-1 Amendment 1:2012* with minor changes.
- Addition of three Electrostatic Discharge tests and the *Mechanical Strength of Contacts*.
- Removal of the *Ultraviolet light* and *Static magnetic fields* tests.
- Addition of the *Peel Strength Including the Edge of the Card* test. This test differs from the *Peel Strength* test by allowing layer bond strength measurement at the card edge and the middle area of the card.
- Revision of chemical lists into tables, which now include the base chemicals for Fuel B and Artificial Perspiration solutions (a normative reference was provided in the second edition).
- Technical changes to *Dynamic Bending Stress* calibration method and *Opacity* measurement reporting.
- Revised figures, tables and informative notes to provide easier and greater understanding of the tests.
- Address for availability of optical reference (ORM7810) media has changed.
- Test methods in the third edition have been refined and relaxed where technically appropriate,

The changes above are a result of industry feedback, harmonisation of standards, and inter-laboratory studies (round robin studies) performed by experts from SC17's Working Group 1^[1]. Additional information has been provided as informative notes within the test methods. Notes are intended to assist in the

understanding or use of the test methods, but are not provisions or requirements necessary to conform in order to be able to claim compliance to this standard.

ISO/IEC 10373 consists of the following parts, under the general title *Identification cards – Test methods*:

- Part 1: General characteristics
- Part 2: Cards with magnetic stripes
- Part 3: Integrated circuit(s) cards with contacts and related devices
- Part 4: Contactless integrated circuit(s) cards
- Part 5: Optical memory cards
- Part 6: Proximity cards
- Part 7: Vicinity cards

This standard defines the ISO/IEC test methods for physical requirements of cards and security devices for personal identification and is utilised by other requirements and test methods. The following ISO/IEC standards reference Part 1 of ISO/IEC 10373 for one or more test methods. Other standards not listed here may also refer to ISO/IEC 10373-1.

- ISO/IEC 7501 series, Identification cards – Machine readable travel documents
- ISO/IEC 7811 series, Identification cards – Recording technique – Embossing and magnetic stripes
- ISO/IEC 7812 series, Identification cards – Identification of issuers
- ISO/IEC 7813, Identification cards – Financial transaction cards
- ISO/IEC 7816 series, Identification cards – Integrated circuit(s) cards with contacts
- ISO/IEC 10373 series, Identification cards – Test methods
- ISO/IEC 10536 series, Identification cards – Contactless integrated circuit(s) cards – Close-coupled cards
- ISO/IEC 11693 series, Identification cards – Optical memory cards – General characteristics
- ISO/IEC 11694 series, Identification cards – Optical memory cards – Linear recording method
- ISO/IEC 11695 series, Identification cards – Optical memory cards – Holographic recording method
- ISO/IEC 14443 series, Identification cards – Proximity integrated circuit(s) cards
- ISO/IEC 15693 series, Identification cards – Vicinity integrated circuit(s) cards
- ISO/IEC 18013 series, Personal identification -- ISO-compliant driving licence
- ISO/IEC 18328 series, Identification cards -- ICC-managed devices
- ISO/IEC 18745 series, Test methods for machine readable travel documents (MRTD) and associated devices
- ISO/IEC 24789 series, Identification cards – Card service life

Cards and security devices for personal identification — Test methods —

Part 1: General Characteristics

1 Scope

This International Standard defines test methods for characteristics of identification cards according to the definition given in ISO/IEC 7810. Each test method is cross-referenced to one or more base standards, which may be ISO/IEC 7810 or one or more of the supplementary standards that define the information storage technologies employed in identification cards applications.

NOTE 1 Criteria for acceptability do not form part of this International Standard but will be found in the International Standards mentioned above.

NOTE 2 Test methods described in this International Standard are intended to be performed separately. A given card is not required to pass through all the tests sequentially.

This part of ISO/IEC 10373 defines test methods which are common to one or more card technologies. Other parts of the standard define technology-specific test methods.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO/IEC 7810, *Cards and security devices for personal identification – Physical characteristics*

ISO/IEC 7811-1, *Identification cards – Physical characteristics*

ISO/IEC 10373-2, *Identification cards – Test methods – Part 2: Cards with magnetic stripes*

ISO/IEC 7816-1, *Identification cards – Integrated circuit cards – Part 1: Cards with contacts – Physical characteristics*

ISO/IEC 7816-2, *Identification cards – Integrated circuit cards – Part 2: Cards with contacts – Dimensions and location of the contacts*

ISO/IEC 14443, *Identification cards – Contactless integrated circuit cards – Proximity cards*

ISO 4287, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters*

ISO 3696, *Water for analytical laboratory use*

ISO 9227:1990, *Corrosion tests in artificial atmospheres – Salt spray tests*

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

IEC 60749-26, *Semiconductor devices – Mechanical and climatic test methods – Part 26: Electrostatic discharge (ESD) sensitivity testing – Human body model (HBM)*

3 Terms and definitions

For the purpose of this International Standard, the following terms and definitions apply:

3.1 test method

method for testing characteristics of identification cards for the purpose of confirming their compliance with International Standards

3.2 testably functional

has survived the action of some potentially destructive influence to the extent that any:

- a) magnetic stripe^[5] present on the card shows a relationship between signal amplitudes before and after exposure that is in accordance with the base standard;
- b) integrated circuit connected to ISO/IEC 7816-2 contacts continues to provide an Answer to Reset response^[6] which conforms to the base standard;
- c) integrated circuit connected to an ISO/IEC 14443 antenna continues to provide a response to an ATQA^[10] (Type A) or ATQB^[10] (Type B);
- d) other integrated circuit continues to operate as intended;
- e) optical memory^[9] present in the card continues to show optical characteristics which conform to the base standard

3.3 warpage

deviation from flatness

3.4 embossing relief height (of a character)

local increase in the height of the card surface produced by the embossing process

3.5 peel strength

ability of a card to resist separation of adjacent layers of material in its structure

3.6

resistance to chemicals

ability of a card to resist degradation of its performance and appearance as a result of exposure to commonly encountered chemicals

3.7

dimensional stability

ability of a card to resist dimensional variation when exposed to defined temperatures and humidity

3.8

adhesion or blocking

tendency of cards to stick together when stacked

3.9

bending stiffness

ability of a card to resist bending

3.10

dynamic bending stress

cyclically applied bending stress of specified magnitude and orientation relative to the card

3.11

dynamic torsional stress

cyclically applied torsional stress of defined magnitude and orientation relative to the card

3.12

normal use

use as an Identification Card (see clause 4 of ISO/IEC 7810), involving equipment processes appropriate to the card technology and storage as a personal document between equipment processes

3.13

ICC

integrated circuit(s) card

3.14

PICC

Proximity integrated circuit(s) card or object

3.15

VICC

Vicinity integrated circuit(s) card or object

3.16

DICC

Dual interface chip card or object

3.17

base standard

the standard to which the test method is used to verify conformance

3.18

ESD

ElectroStatic Discharge into the contacts of an IC card

3.19

ESS

ElectroStatic Stress applied to a PICC or VICC via a constant electrostatic field

3.20

ESDC

ElectroStatic Discharge Conductivity - ability of a card to conduct or transport electrostatic discharge

4 Default items applicable to the test methods

4.1 Test environment

Unless otherwise specified, testing shall take place in an environment having a temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($73^{\circ}\text{F} \pm 5^{\circ}\text{F}$) and relative humidity of 40% to 60%.

4.2 Pre-conditioning

Where pre-conditioning is required by the test method, the identification card to be tested shall be conditioned to the test environment for a period of 24 h before testing.

4.3 Selection of test methods

Tests shall be applied as required to test the attributes of the card defined by the relevant base standard.

4.4 Default tolerance

Unless otherwise specified, a default tolerance of $\pm 5\%$ shall be applied to the quantity values given to specify the characteristics of the test equipment (e.g. linear dimensions) and the test method procedures (e.g. test equipment adjustments).

4.5 Total Measurement Uncertainty

It is recommended that the Total Measurement Uncertainty is reported with the results, and is considered when judging conformity. The Total Measurement Uncertainty should be less than 20% of the permitted tolerance range. JCGM 100^[3] provides guidance for determining and expressing the Total Measurement Uncertainty.

5 Test methods

5.1 Card warpage

The purpose of this test is to measure the degree of warpage of a card test sample.

5.1.1 Apparatus

- Flat level rigid plate;
- Suitable measurement device or a gauge with an accuracy of $\pm 0,03$ mm (0.0012 in).

5.1.2 Procedure

Pre-condition the sample card according to 4.2 before testing and conduct the test under the test environment defined in 4.1.

Place the sample card on the level rigid plate of the measuring apparatus. At least three corners of the card shall rest on the plate (warpage of the card in convex form to the plate). Use a suitable measurement device or gauge to determine that no point on the card's surface is at a distance of more than the permitted maximum warpage from the level rigid plate, as shown in Figure 1. The measurement device or gauge shall not change the warpage of the card.

NOTE The point of maximum displacement is not necessarily at the centre of the card.

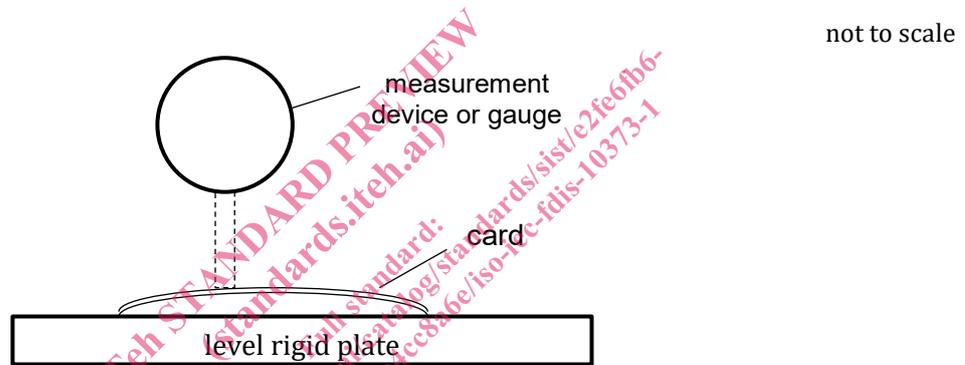


Figure 1 — Warpage measurement apparatus

5.1.3 Test report

The test report shall state if the warpage of the card complies with the requirement, and optionally the measured warpage.

5.2 Dimensions of cards

The purpose of this test is to measure the height, width and thickness of a card test sample.

5.2.1 Thickness of card measurements

5.2.1.1 Apparatus

A micrometer with a flat anvil and spindle whose diameter is within the range of 3 mm to 8 mm (0.12 in to 0.32 in), having a precision of 0,005 mm (0.00020 in) and a pressure range of 0,1 N/mm² to 0,4 N/mm² (14.5 lbf/in² to 58.0 lbf/in²).

5.2.1.2 Procedure

Pre-condition the sample card according to 4.2 before testing and conduct the test under the test environment defined in 4.1.

Use the micrometer to measure the thickness of the card at four points, one in each of the four quadrants of the card (see Figure 2 for the location of the quadrants). The measurements shall be made at locations on the card that do not include signature panels, magnetic stripes or contacts (integrated circuit/s cards), or any other raised area.

5.2.1.3 Test report

The test report shall give the maximum and the minimum values of the four measurements.

not to scale

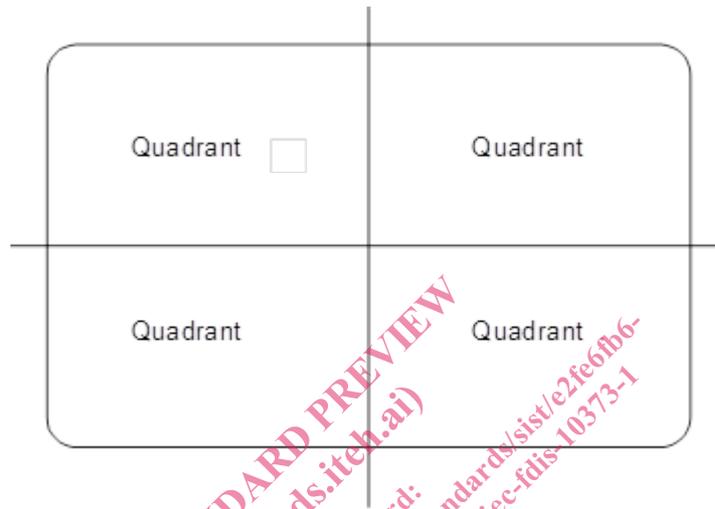


Figure 2 — Assignment of quadrants

5.2.2 Height and width of card measurement

5.2.2.1 Apparatus

The following items are required:

- a level horizontal rigid surface having a deviation from flatness not greater than $3,2 \mu\text{m}$ (0.000128 in) over the width of the card;
- a measuring device with a precision of $2,5 \mu\text{m}$ (0.0001 in);
- a load of $2,2 \text{ N} \pm 0,2 \text{ N}$ (0.495 lbf \pm 0.045 lbf).

5.2.2.2 Procedure

Pre-condition the sample card according to 4.2 before testing and conduct the test under the test environment defined in 4.1.

Place the sample card on the level horizontal rigid surface and flatten it under the load. Measure the height and width of the card. Find the maximum and minimum height and the maximum and minimum width.

5.2.2.3 Test report

The test report shall state whether the card conforms to the base standard and shall record the maximum and minimum values of height and width recorded.

5.3 Peel strength

The purpose of this test is to measure the peel strength between card layers.

5.3.1 Apparatus

The following items are required:

- a) sharp cutting knife;
- b) pressure sensitive adhesive filament (fibre reinforced) tape or a suitable clamp;
- c) tensile tester equipped with chart recorder or equivalent;
- d) gripping device;
- e) Stabilising plate backed with adhesive or adhesive tape is required when the layer being peeled is more than 20% of the total card thickness.
 - the adhesive strength shall be sufficient to ensure that the plate and card do not separate during testing;
 - the plate shall not bend during the measurement;
 - the size of the plate shall be equal to, or greater than, the size of the card.

EXAMPLE - A suitable plate might be a 60 mm × 90 mm × 2 mm aluminium plate backed with adhesive tape.

5.3.2 Procedure

Pre-condition the sample card according to 4.2 before testing and conduct the test under the test environment defined in 4.1.

Cut the card, or score through the layer, to produce sections of width 10,0 mm ± 0,2 mm (0.390 in ± 0.008 in) as shown in Figure 3.

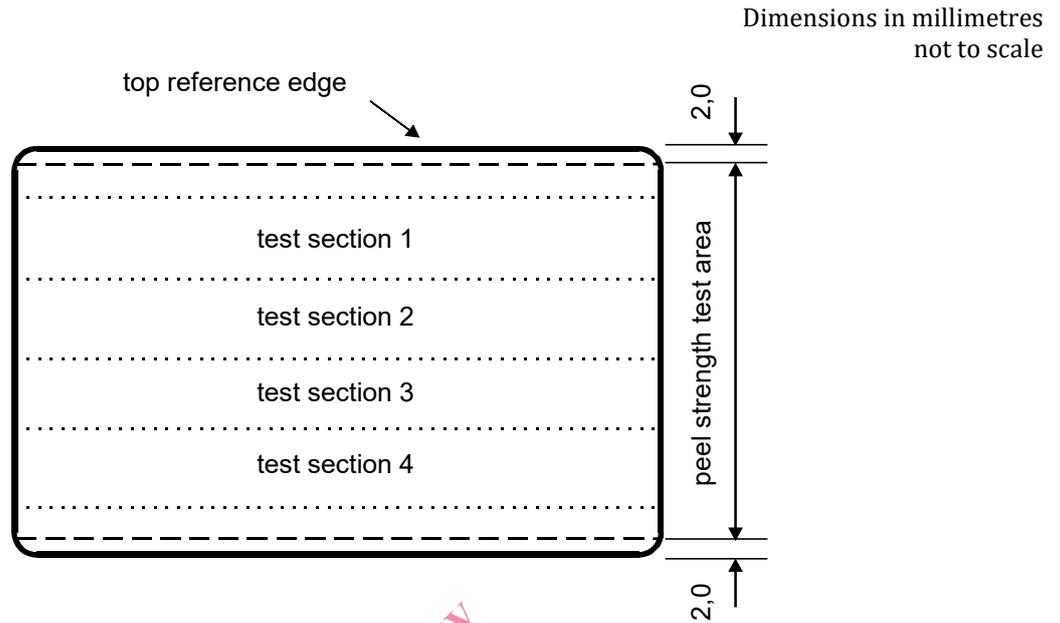


Figure 3 — Card preparation

Using a sharp knife, cut the layer back from the core approximately 10 mm (0.4 in) and apply the clamp or adhesive tape to the cut back edge of the layer and core as shown in Figure 4.

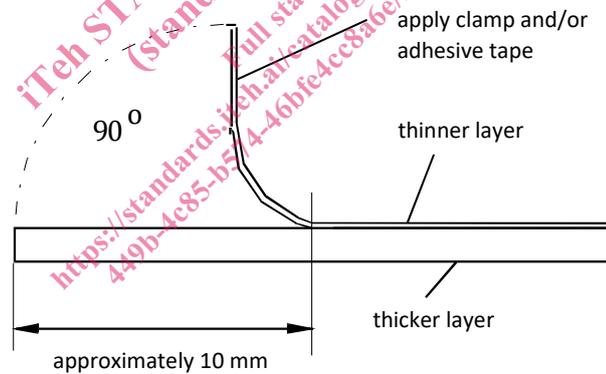


Figure 4 — Specimen preparation for peel test

If the peeling angle cannot be kept at 90° during the measurement, attach the stabilising plate to the core in advance.

Place the prepared specimen in the tensile tester fixture as shown in Figure 5.