INTERNATIONAL STANDARD

ISO/IEC 24789-2

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Identification cards — Card service life —

Part 2: Methods of evaluation

Cartes d'identification — Durée de vie des cartes —

Partie 2: Méthodes d'évaluation

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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 document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 24789-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

ISO/IEC 24789 consists of the following parts, under the general title *Identification cards — Card service life*:

— *Part 1: Application profiles and requirements*

— *Part 2: Methods of evaluation*

Introduction

This part of ISO/IEC 24789 comprises methods of evaluation of identification (ID) card service life.

These methods of evaluation complement the application profiles and requirements defined in ISO/IEC 24789-1, which are intended to be used by card issuers, card manufacturers and card component suppliers to represent the comparative rigour of various ID card service life applications. They provide a means for ranking and comparing the main factors affecting ID card service life in a manner that is amenable to evaluation using the methods defined or referenced in this part of ISO/IEC 24789.

Identification cards — Card service life —

Part 2:
Methods of evaluation

1 Scope

This part of ISO/IEC 24789 specifies methods of evaluation for ID-1 identification card service life in the applications referred to in ISO/IEC 24789-1. It contains no additional or changed requirements for the ID-1 card properties defined in other applicable standards.

NOTE 1 At the time of publishing this first edition, there is limited data to show direct equivalence to any measure of actual field use conditions. It will not be possible to establish any such equivalence until and unless a degree of quantitative correlation has been established for the ID card construction in question.

NOTE 2 For the convenience of certain users, non-S.I. equivalents are given for some quantity values where these are in common use in the ID card industry. These equivalents appear in parentheses and are for information only.

2 Normative references

The following referenced documents are indispensible 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 24789-1, *Identification cards — Card service life — Part 1: Application profiles and requirements*

ISO/IEC 7810, *Identification cards — Physical characteristics*

ISO/IEC 7811-2, *Identification cards — Recording technique — Part 2: Magnetic stripe — Low coercivity*

ISO/IEC 7811-6, *Identification cards — Recording technique — Part 6: Magnetic stripe — High coercivity*

ISO/IEC 7811-8, *Identification cards — Recording technique — Part 8: Magnetic stripe — Coercivity of 51,7 kA/m (650 Oe)*

ISO/IEC 10373-1, *Identification cards — Test methods — Part 1: General characteristics*

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

ISO/IEC 14443-1, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 1: Physical characteristics*

ISO 105-B02, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

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

IEC 60454-2, *Pressure-sensitive adhesive tapes for electrical purposes — Part 2: Methods of test*

CIE Publication 116-1995, *Industrial Colour-Difference Evaluation*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms, definitions, symbols and abbreviations given in ISO/IEC 7810, ISO/IEC 10373-1, ISO/IEC 10373-2, ISO/IEC 24789-1 and the following apply.

3.1.1
card fracture
crack or break in a card whose depth is at least one third of the card thickness

3.2 Abbreviated terms

ICM integrated circuit(s) module

ICC integrated circuit(s) card

4 Default items applicable to the evaluation methods

4.1 Test environment

Unless otherwise specified, evaluation shall take place in an environment having a temperature 23°C ± 3°C (73°F ± 5°F) and relative humidity of 40 % to 60 %.

4.2 Pre-conditioning

Where pre-conditioning is required by the evaluation method, the identification cards to be evaluated shall be conditioned to the default test environment for a period of 24 h before evaluation.

4.3 Selection of evaluation methods

Methods of evaluation shall be applied as required by the application profile of the card defined in ISO/IEC 24789-1.

4.4 Default tolerance

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

4.5 Total measurement uncertainty

The total measurement uncertainty for each quantity determined by these evaluation methods shall be stated in the test report.

5 Methods of evaluation for card service life (CSL)

5.1 Xenon arc light exposure

The purpose of this test is two-fold:

a) The procedure can be used as a preconditioning step before, or as a test step in, a sequential test. Cards will be exposed to Xenon arc to accelerate aging of the plastic materials. This aging typically causes plastics to lose ductility and become more susceptible to mechanical failures.

b) The test can also be used as a means for determining discoloration of card materials due to UV degradation. The test will allow for simulation of outdoor exposure (no window glass filter) and indoor exposure (use of window glass filter).

5.1.1 Apparatus

Xenon Arc Test Chamber conforming to ISO 105-B02 and constructed with:

— Xenon arc lamp;

— IR (daylight) filter to cut out wavelengths greater than 800 nm;

— window glass filter (when applicable);

— black body temperature control.

5.1.2 Procedure

Mount the cards in the test chamber with the card surface of interest exposed.

Close the chamber to prevent leakage. Expose the cards to the Xenon arc for 24 h under the following test conditions:

a) black-standard temperature of 50 °C ± 5 °C (122 °F ± 9 °F) as measured with a black-standard thermometer as defined in ISO 105-B02;

b) illumination intensity:

   — without window filter – “Outdoor” exposure
   0,65 w/m^2 using a control point[1)] of 420 nm
   550 w/m^2 using a control point[2)] of 290 nm to 800 nm;

   — with window filter – “Indoor” exposure
   0,65 w/m^2 using a control point of 420 nm
   550 w/m^2 using a control point of 290 nm to 800 nm.

Allow the cards to cool to room temperature and remove them from the test chamber.

If used as a preconditioning test, continue with the remaining test procedures.

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1) Test equipment using a 420 nm control point is made by QSun (models Xe-1 and Xe-3). This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of these products. Other manufacturers using this control point may be used as long as they meet the requirements of ISO 105-B02.

2) Test equipment using a 290 nm to 800 nm control point is made by Atlas (all Suntest models). This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of these products. Other manufacturers using this control point may be used as long as they meet the requirements of ISO 105-B02.

5.1.3 Evaluation report

Unless specified otherwise by the base standard:

a) record the number of hours of Xenon arc light exposure, the illumination intensity and any filters used;

b) record any colour change observations and method of evaluation:

- visual;
- colour difference ΔE^*_{Lab} or ΔE^*_{Lch} measured using CIE 1994 as defined in CIE Publication 116-1995 (or later version) L*a*b* or L*C*h* with standard illuminant D65 and 10° observer;
- (optionally) reflection density changes (ISO 5-3 and ISO 5-4).

c) record whether or not the cards remain testably functional following application of the procedure and report the version of the colour difference measurement method used.

5.2 Surface abrasion

The purpose of this method is to provide controlled abrasion of the card surface.

5.2.1 Apparatus

- Abraser with vacuum pick up or equivalent[3];
- 2 abrasive Wheels (Taber CS -10F or equivalent);
- resurfacing disks (Taber S-11 or equivalent);

- dry soft cleaning cloth;
- hole punch or equivalent;
- 500 g total load per wheel (250 g additional - no counter weight wheels).

5.2.2 Procedure

Prepare two sample cards that have all the desired information and features by punching or cutting a notch in the card as shown in Figure 1.

Resurface the abrasive wheels for 50 cycles before beginning the procedure and then again after every 250 cycles. Clean the cards and turntable thoroughly, using a dry soft cloth, to remove all debris. Avoid direct finger contact with the test cards and abrasion wheels.

Mount the two cards side by side on the turntable without any compliant pad so that the abrasive wheels pass over the desired areas. The abrasive wheels must not bounce during the procedure. Place the abrasive wheels on the card and the vacuum nozzle 6,4 mm (0.25 in) above the cards.

3) The abraser apparatus and abrasive wheels may be obtained from Taber Industries, 455 Bryant Street, North Tonawanda, New York 14120. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of these products. Equivalent products may be used if they can be shown to lead to the same results.

Preset the specified number of cycles and start the abraser and vacuum. Stop the procedure after the specified number of cycles or until wear through of the card feature is observed. The procedure may be stopped after 5,000 cycles have occurred without wear through. Stopping the procedure periodically to observe the point of wear-through is recommended.

Dimensions in millimetres (inches)
not to scale

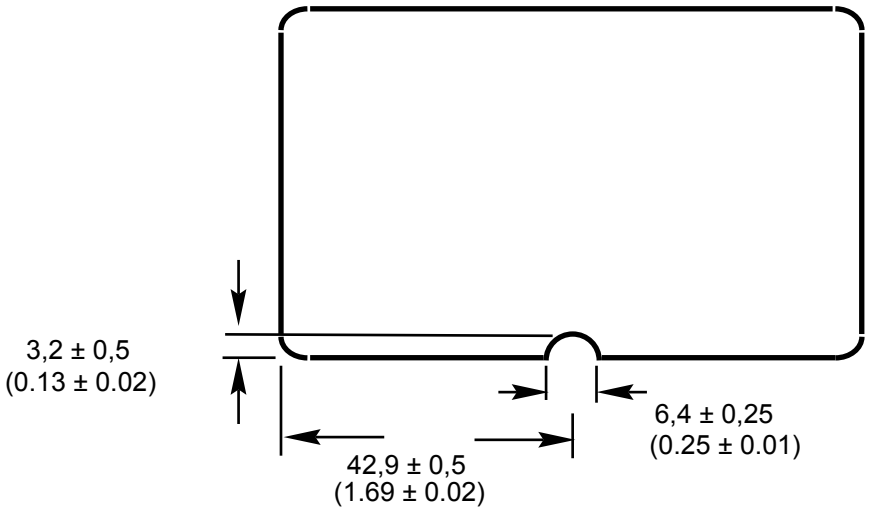

Figure 1 — Test card notch location

5.2.3 Evaluation report

Unless specified otherwise by the base standard, compare the wear-through of the card to a control card or the number of cycles to the specified requirement.

5.3 Magnetic stripe abrasion

The purpose of this method is to provide a controlled abrasion of the magnetic stripe surface.

5.3.1 Apparatus

— Abraser with vacuum pick up or equivalent[4)]

— filler card (card of the same thickness as the card to be abraded);

— 2 abrasive wheels (Taber CS -10F or equivalent);

— resurfacing disks (Taber S-11 or equivalent);

— 500 g total load per wheel (250 g additional - no counter weight wheels);

— dry soft cleaning cloth;

4) The abraser apparatus and abrasive wheels may be obtained from Taber Industries, 455 Bryant Street, North Tonawanda, New York 14120. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of these products. Equivalent products may be used if they can be shown to lead to the same results.

— hole punch or equivalent;

— magnetic stripe read test equipment with the following characteristics:

  — ISO/IEC 10373-2 compliant;

  — capable of reporting average signal amplitude (U_A) on middle third of Track 2 (see ISO/IEC 7811-2, ISO/IEC 7811-6 or ISO/IEC 7811-8).

5.3.2 Procedure

Prepare the card by encoding on Track 2 with a recording density of 8 ftpmm (200 ftpi), with a relative tolerance of ± 10 %, at a recording current of I_{min}, in accordance with ISO/IEC 7811-2, ISO/IEC 7811-6 or ISO/IEC 7811-8 and ISO/IEC 10373-2).

NOTE 1 If the magnetic stripe material is required to comply with any established standard, the compliance tests must be conducted and the results acceptable prior to this procedure.

Punch a hole in the card as shown in Figure 2.

Measure the average signal amplitude $U_{Ainitial}$ in the read area shown in Figure 2.

Resurface the abrasive wheels for 50 cycles before testing begins and after every 100 cycles. Clean the cards and turntable using a dry soft cloth after the abrasive wheels are resurfaced. Avoid direct finger contact with the cards and abrasion wheels. Complete the procedure for each card to the stopping point before recommencing it with another card.

Mount the card on the turntable without any compliant pad. Add a filler card of the same thickness as the card on the specimen plate so that the abrasive wheels do not bounce when the procedure is in progress. Place the abrasive wheels (with the additional loads) on the card and the vacuum nozzle 6,4 mm (0.25 in) above the cards.

Preset the abraser for 50 cycles and start the abraser and vacuum. Ensure that the abrasive wheels do not bounce during the test.

Remove the card and clean the magnetic stripe thoroughly, using a clean soft cloth, to remove debris.

NOTE 2 Particular care should be taken to ensure that the stripe is completely free from debris in order to avoid causing damage to the magnetic head used to measure the signal amplitude.

Re-measure average signal amplitude (U_A) in the read area shown in Figure 2.

Repeat the sequence of 50 abraser cycles followed by measurement of the average signal amplitude (U_A) in the read area shown in Figure 2 until a value of U_A is achieved such that $U_A \leq 0{,}70\ U_{A\ initial}$. The procedure may be stopped after 5 000 Taber cycles have occurred without achieving $U_A \leq 0{,}70\ U_{A\ initial}$.