INTERNATIONAL STANDARD

ISO/IEC 15457-1

Second edition
2008-03-01

Identification cards — Thin flexible cards —

Part 1: Physical characteristics

Cartes d'identification — Cartes flexibles fines —

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. 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 15457-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

This second edition cancels and replaces the first edition (ISO/IEC 15457-1:2001), which has been technically revised.

ISO/IEC 15457 consists of the following parts, under the general title *Identification cards — Thin flexible cards*:

— *Part 1: Physical characteristics*

— *Part 2: Magnetic recording technique*

— *Part 3: Test methods*

Identification cards — Thin flexible cards —

Part 1: Physical characteristics

1 Scope

Thin flexible cards (TFC), the subject of ISO/IEC 15457, are used to automate the controls for access to goods or services such as mass transit, highway toll systems, car parks, vouchers, stored value, etc.

For these applications, data can be written and/or read by machines using various recording techniques such as magnetic stripe, optical character recognition (OCR), bar code, contactless, etc.

This part of ISO/IEC 15457 specifies the physical characteristics of thin flexible cards at two points in the card life cycle:

1. at the point of loading into the card issuing equipment;
2. at the point of issue to the public.

It takes into consideration both human and machine aspects and states the minimum requirements.

The principal card sizes are identified and the characteristics and dimensions are specified.

Guidance concerning the storage and use of cards under various environmental conditions is given.

NOTE ID-1 cards, specified in ISO/IEC 7810, do not come within this scope.

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 1831, *Printing specifications for optical character recognition*

ISO 1924-2, *Paper and board — Determination of tensile properties — Part 2: Constant rate of elongation method (20 mm/min)*

ISO 2144, *Paper, board and pulps — Determination of residue (ash) on ignition at 900 °C*

ISO 2471, *Paper and board — Determination of opacity (paper backing) — Diffuse reflectance method*

ISO 5626, *Paper — Determination of folding endurance*

ISO 5627, *Paper and board — Determination of smoothness (Bekk method)*

ISO 5629, *Paper and board — Determination of bending stiffness — Resonance method*

ISO 6383-2, *Plastics — Film and sheeting — Determination of tear resistance — Part 2: Elmendorf method*

ISO 8570, *Plastics — Film and sheeting — Determination of cold-crack temperature*

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

ISO/IEC 10373-6, *Identification cards — Test methods — Part 6: Proximity cards*

ISO/IEC 15457-2, *Identification cards — Thin flexible cards — Part 2: Magnetic recording technique*

ISO/IEC 15457-3, *Identification cards — Thin flexible cards — Part 3: Test methods*

3 Terms and definitions

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

3.1
back face
face of the card opposite the front

3.2
finished card
card at the point of issue to the public

3.3
front face
reference face of the card (which normally bears printed information relating to its origin and ownership)

3.4
height
dimension parallel to the shortest edge of the card

3.5
print contrast signal
PCS
print contrast of a machine readable printed mark, defined as:

$$PCS = \frac{R_w - R_p}{R_w}$$

where

R_p is the reflectance of the printed mark, measured in accordance with ISO 1831 for the B 900 spectral band;

R_W is the reflectance of the background surrounding the printed mark, measured in accordance with ISO 1831 for the B 900 spectral band.

3.6
recording technique
technique, such as magnetic, contactless or optical encoding etc., used to store data on the card

3.7
reference edges
datum edges for dimensioning and orientation, having a fixed relationship to the front of the card

3.8
regular card
card without thermal sensitive coating

3.9
tactile identifier
feature used to determine the orientation of the card

3.10
thermal card
card with thermal sensitive coating

3.11
width
dimension parallel to the longest edge of the card

3.12
wood free
(of paper) 100% chemical pulp, containing no ground wood

3.13
normal use
use as an identification card involving equipment processes appropriate to the card technology and storage as a personal document between equipment processes

3.14
twist
off-axis curl resulting in the four corners of the card not being co-planar

3.15
sizing and pen writing factor
capacity of a paper for receiving lines of aqueous ink (pen ink) without smudging or going through the paper

3.16
join or splice
link made between two lengths of continuous conjoined cards (e.g. to eliminate one or more defective contactless cards)

3.17
Limited Use Card
LUC
card conforming to ISO/IEC 15457-1 that is equipped for contactless applications

4 General characteristics

4.1 Introduction

Three card formats are recognized, and classified as follows to correspond with other existing schemes of classification:

— TFC.0, size 66 mm x 30 mm;

— TFC.1, size 85 mm x 54 mm normal Thickness (see Table 1);

— Special TFC.1, size 85 mm x 54 mm with increased thickness (see Table 1);

— TFC.5, size 187 mm or 203 mm x 83 mm.

For each format of card, the geometrical and topographical characteristics are specified separately in the relevant clause of this part of the standard. The remaining physical characteristics, which are common to all sizes, are specified in this clause.

Magnetic stripe and track characteristics are specified in ISO/IEC 15457-2.

Contactless characteristics are specified in ISO/IEC 10536, ISO/IEC 14443 or ISO/IEC 15693.

All clauses in all parts of ISO/IEC 15457 apply to finished cards or to the reels/packs from which such cards are taken. Certain clauses however concern the characteristics of the card throughout its life.

As a matter of convenience and practicality, certain tests can be carried out on unfinished cards where it can be demonstrated that no significant change in that characteristic can arise during subsequent processing.

4.2 Materials

Materials for TFCs of various thicknesses are defined in Annexes A, B and C, as shown in Table 1.

Table 1 — Permitted materials v TFC size

Permitted materials	TFC.0[1]	TFC.1	Special TFC.1	TFC.5
Paper	A270	A178, A250, A270,	A 290-680	A178
Composite	B270	B250,	B250, B360, B400-680	not specified
Plastic	C270	C250, C270	C250, C270, C290-680	not specified
NOTE Table entries refer to the nominal thickness of the material and the annex in which it's specification is given, e.g. A178 refers to 178 micron material from Annex A.				

4.3 Finishing

Thin flexible cards are finished in a variety of ways, in accordance with the requirements of the system in which they are to be used. They may be

— printed or pre-printed except in areas used by recording techniques and machine functions (e.g. magnetic stripes, positioning marks, where used);

— equipped for one or more recording techniques (e.g. magnetic stripes, optical bar codes, contactless).

Thin flexible cards shall not be embossed.

Regardless of any of these finishing processes, the finished cards shall continue to conform to the requirements of this standard.

4.4 Quality of TFC products

All cards, however presented, shall be generally free from minor defects which could interfere with the performance of TFCs or which detract from their visual appearance, such as joins, excessive dust, cutting debris, folds, tears, creases and thick spots.

[1] Note that TFC.0 materials are not necessarily the same as TFC.1 materials of the same thickness.

Due to characteristics of product, stripe of contactless cards when presented in reel or in fan-fold can have join defined in section 8.4.

4.5 Reference edges

Any specification for a thin flexible card conforming to this standard shall nominate a reference face (the front) and two reference edges, having the relationship shown in Figure 1, such that all features of the finished card can be located within the same frame of reference.

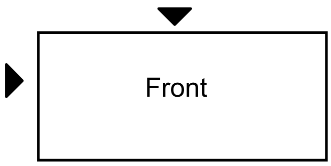

Figure 1 — Relationship between card front and reference edges

It is preferred that the front of the card should be that which is designated to carry the major printed identification information (e.g. system logo or name) and that human readable information on the front shall be upright when the card is held with one of the two reference edges at the top.

Once identified, these same reference edges shall be used exclusively and consistently when locating all features specified in this and the other applicable parts of ISO/IEC 15457.

4.6 Card life

4.6.1 Before issue

Cards stored in their original packing, under conditions specified in 4.7.2, shall remain in conformance with this standard for at least be one year.

Cards stored in operational devices (e.g. issuing machines), under the conditions specified in 4.7.3, shall remain in conformance with this standard for at least two months.

4.6.2 After issue

Finished cards stored under the conditions specified in 4.7.2, without further use, shall remain in conformance with this standard at least one year.

NOTE Paper materials specified in Annex A may be expected to withstand up to 50 transaction cycles, composite materials specified in Annex B may be expected to withstand up to 500 transaction cycles; plastic materials specified in Annex C may be expected to withstand up to 2 500 transaction cycles. The actual lifetimes achieved will of course be affected by many external factors.

Cards shall resist deterioration from exposure to light and other environmental factors encountered in normal use.

Where abnormally demanding conditions of use are likely to affect life expectancy, these shall be taken into account when selecting suitable card materials and methods of manufacture.

4.7 Environmental conditions

4.7.1 Testing environment

Each of the characteristics specified in this standard shall be measured under the environmental conditions specified in ISO/IEC 15457-3. For most characteristics, these conditions are 23 °C and 50 % relative humidity.

NOTE Under different conditions, certain characteristics will change significantly, including dimensions (width, height, thickness), weight, flatness and many of the physical parameters listed in Tables A.1, B.1 and C.1. At the extremes of the operating environment (see 4.7.3), these changes can be substantial, and should be taken into account in the design of TFC handling devices.

4.7.2 Storage environment and packaging

Thin flexible cards shall be stored under the conditions specified in Table 2.

Table 2 — Storage conditions

Card type	Temperature °C	Relative humidity %
Regular cards	0 to 50	30 to 65
Thermal cards	0 to 40	30 to 65

The purpose of the packaging is to protect cards from physical damage and to reduce the rate of humidity variation. As a consequence:

— cards shall be kept in their original packaging for as long as is practical;

— boxes shall be stored on a flat surface, respecting "top" and "bottom" indications;

— boxes shall not show any apparent distortion or other damage.

The packaging may be defined by the user but shall enable the above conditions to be met.

4.7.3 Operating environment

Sudden changes in environmental conditions can cause card distortion. Packages containing cards shall therefore be approximately in equilibrium with surrounding conditions before they are opened.

Cards shall remain in conformance with Table 4, retain their structural integrity and remain usable within the range of ambient conditions specified in Table 3.

Table 3 — Operating conditions v Card type

Card type	Temperature[1] °C	Relative humidity %
Standard cards	-35 to 50	15 to 85
Special TFC 1 cards	- 20 to 50	15 to 85

[1] In some applications, the temperature range can be limited by the cold crack temperature (see Annex C).

5 Outline geometry

Table 4 shows, for each TFC format, the values of the quantities specified in Clause 5.

Table 4 — Quantity values for outline geometry

dimensions in millimetres except where indicated otherwise

		TFC size		
Quantity	**Quantity symbol**	**0**	**1 & Special TFC.1**	**5**
Width	*W*	66,0 +1,0/-0,5	85,6 +1,0/-0,5	203,20 ± 0,38[1] 187,33 ± 0,38[2]
Height under testing conditions (see 4.7.1)	*H*	30,0±0,1	53,98±0,2	82,55 ± 0,18
Height variation under operating conditions (see Table 3)	*H*	29,8 to 30,3	53,6 to 54,5	82,10 to 83,25
Corners	α (Figures 2, 3, 4)	90°±1°	90°±1°	90°±1°
	R (Figure 4)	3,20±0,05	3,20±0,05	6,35±0,05
	a (Figures 3, 4)	3,20±0,10	3,20±0,10	6,35±0,10
	b (Figures 4)	not specified	3,2±0,5	not specified
	β (Figure 3)	not specified	45°±1°	not specified
Edge straightness		±0,05	±0,05	±0,05
Mismatch (barb)	*C*	0,1	0,1	0,1
Discontinuity	*D*	0,1	0,1	0,1
1 TFC.5 with stub. 2 TFC.5 without stub.				

5.1 Dimensions

Dimensions shall be as shown in Table 4 for the selected card format.

5.2 Corners

Corners shall be rectangular, beveled or rounded, as shown in Table 4.

The parameters of corner geometry for which values are given in Table 4 are shown in Figure 2, Figure 3 and Figure 4.

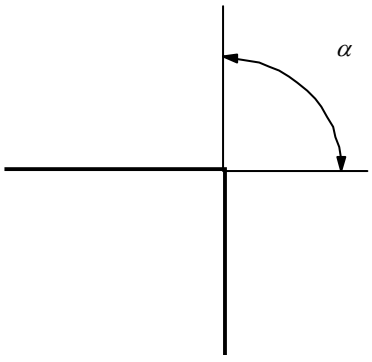

Figure 2 — Rectangular corner

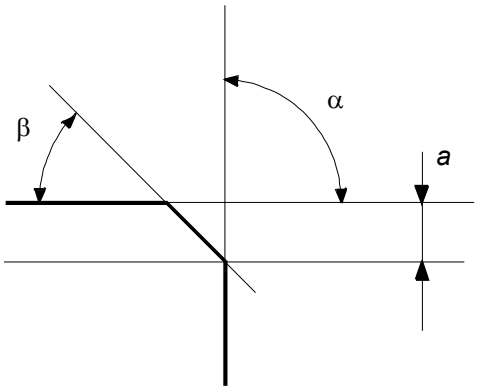

Figure 3 — Beveled corner

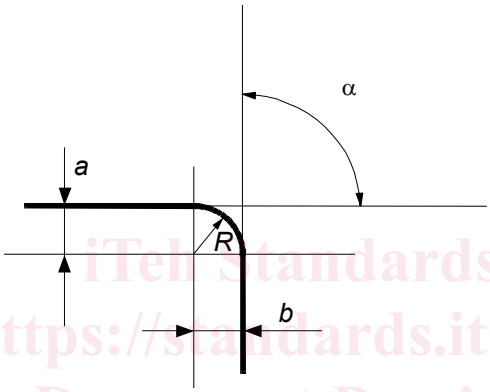

Figure 4 — Rounded corner

5.3 Edges

Each card edge and corner bevel (as applicable to the card format) shall be straight to within the value given in Table 4 except, in the case of a rounded corner, within a corner arc.

Any mismatch (barb) between a rounded corner and either of its adjacent sides shall be limited to the value of maximum displacement given in Table 4 of the side from the parallel tangent on the corner arc.

Discontinuities in any rounded corner (cut-ins, fibre clusters, single fibres – see Figure 5) shall be limited to the value of maximum deviation given in Table 4 from a smooth corner arc of the same radius.

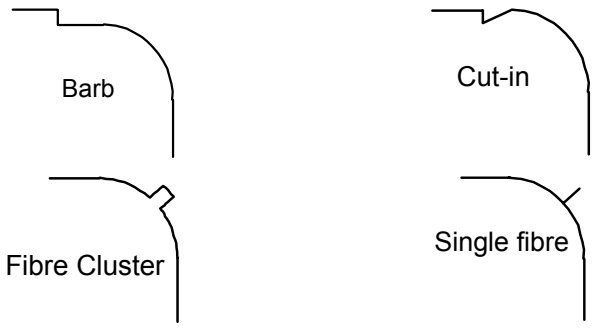

Figure 5 — Edge defects illustrated on rounded corner example