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**Identification cards — Physical  
characteristics**

*Cartes d'identification — Caractéristiques physiques*

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Published in Switzerland

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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.

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](http://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](http://www.iso.org/patents)) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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

This fourth edition cancels and replaces the third edition (ISO/IEC 7810:2003), which has been technically revised. It also incorporates the Amendments ISO/IEC 7810:2003/Amd.1:2009 and ISO/IEC 7810:2003/Amd.2:2012.

The main changes compared to the previous edition are as follows:

- the test method and criteria for opacity has changed; previously the test method used a spectrophotometer and criteria included both visible and IR light; the present method uses 2 frequencies of only IR light and a reference material to establish compliance;
- criteria for cards containing certain types of IC's has been added (formerly these were in the specific IC card standards but as the same requirement applies to many types of IC cards they have been placed in this document);
- the heat deflection test (formerly Annex A) has been placed in ISO/IEC 10373-1;
- the clause on light exposure has additional explanation;
- the overall size tolerance of the ID-1 size returned card has changed (5.2);
- patch layer peel strength has been added and is lower than other values (8.7);
- address for availability of optical reference media has changed.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This document defines the minimum physical requirements for the identification card and is used by the following identification card standards for recording technologies. Other standards not listed here may also refer to this document.

- ISO/IEC 7501 (all parts), *Identification cards — Machine readable travel documents*
- ISO/IEC 7811 (all parts), *Identification cards — Recording technique — Embossing and magnetic stripes*
- ISO/IEC 7812 (all parts), *Identification cards — Identification of issuers*
- ISO/IEC 7813, *Identification cards — Financial transaction cards*
- ISO/IEC 7816 (all parts), *Identification cards — Integrated circuit(s) cards with contacts*
- ISO/IEC 10373 (all parts), *Identification cards — Test methods*
- ISO/IEC 10536 (all parts), *Identification cards — Contactless integrated circuit(s) cards — Close-coupled cards*
- ISO/IEC 14443 (all parts), *Identification cards — Proximity integrated circuit(s) cards*
- ISO/IEC 15693 (all parts), *Identification cards — Vicinity integrated circuit(s) cards*
- ISO/IEC 11693-1, *Identification cards — Optical memory cards — Part 1: General characteristics*
- ISO/IEC 11694 (all parts), *Identification cards — Optical memory cards — Linear recording method*
- ISO/IEC 24789 (all parts), *Identification cards — Card service life*
- ISO/IEC 18328 (all parts), *Identification cards — ICC-managed devices*

NOTE Notes in this document are only used for giving additional information intended to assist in the understanding or use of this document and do not contain provisions or requirements to which it is necessary to conform in order to be able to claim compliance with this document.

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# Identification cards — Physical characteristics

## 1 Scope

This document describes the characteristics for identification cards and the use of such cards for international interchange.

This document specifies the physical characteristics of identification cards including card materials, construction, characteristics and dimensions for four sizes of cards.

ISO/IEC 10373-1 and ISO/IEC 24789-2 specify the test procedures used to check cards against the parameters specified in this document.

This document specifies the requirements for cards and card interface devices used for identification. It takes into consideration both human and machine aspects and states minimum requirements.

It is the purpose of this document to provide criteria for the performance of cards. No consideration is given within this document to the amount of use, if any, experienced by the card prior to test.

NOTE 1 Numeric values in the SI and/or Imperial measurement system in this document have been rounded off and therefore are consistent with, but not exactly equal to, each other. Either system can be used, but intermixing or reconverting the two can result in errors. The original design was made using the Imperial measurement system.

NOTE 2 Thin flexible cards are not within the scope of this document (see the ISO/IEC 15457 series).

## 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.

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

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

ISO/IEC 24789-2, *Identification cards — Card service life — Part 2: Methods of evaluation*

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

## 3 Terms and definitions

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

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

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

### 3.1

#### identification card

card identifying its holder and issuer which may carry data required as input for the intended use of the card and for transactions based thereon

1) New edition under preparation. Stage at the time of publication: ISO/IEC DIS 10373-1:2019.

**3.2**

**signature panel**

special material added to the card surface intended to have a signature applied

**3.3**

**warpage**

deviation from flatness

**3.4**

**normal use**

use as an *identification card* (3.1) involving equipment processes appropriate to the card technology, and storage as a personal document between equipment processes

**3.5**

**ID-1**

nominally 85,60 mm (3.370 in) wide by 53,98 mm (2.125 in) high by 0,76 mm (0.030 in) thick

**3.6**

**ID-2**

nominally 105,00 mm (4.134 in) wide by 74,00 mm (2.913 in) high by 0,76 mm (0.030 in) thick

**3.7**

**ID-3**

nominally 125,00 mm (4.921 in) wide by 88,00 mm (3.465 in) high by 0,76 mm (0.030 in) thick

**3.8**

**raised area**

area whose surface is raised above that of the surrounding card surface by addition of some feature such as a hologram, *signature panel* (3.2), magnetic stripe, photograph, *integrated circuit* (3.13) *contacts* (3.14), embossed characters, security elements, tactile elements, sensors, displays, buttons

**3.9**

**unused card**

card possessing all the components required for its intended purpose, which has not been subjected to any personalization or testing operation, and which has been stored in a clean environment at temperatures between 5 °C to 30 °C (41 °F to 86 °F) and humidity between 10 % to 90 % with no more than 48 h exposure to day-light without experiencing thermal shock

**3.10**

**returned card**

card which has been issued to the card holder and returned

**3.11**

**ID-000**

nominally 25 mm (0.984 in) wide by 15 mm (0.591 in) high by 0,76 mm (0.030 in) thick

**3.12**

**opacity reference**

reference card designated ORM 7810 used to establish opacity compliance

Note 1 to entry: Opacity reference cards can be ordered from Eclipse Laboratories, 1025 North Highway 3, Northfield, MN 55057, USA until at least 2027.

**3.13**

**integrated circuit**

electronic component designed to perform processing and/or memory functions

**3.14**

**contact**

conducting element ensuring galvanic continuity between *integrated circuit(s)* (3.13) and the external interfacing equipment

**3.15****ICC**

*ID-1* (3.5) size card containing one or more *integrated circuits* (3.13) independent of the interface

**3.16****patch layer**

die cut film applied during the card personalization process that is smaller than the *ID-1* (3.5) size height and width and does not extend to or beyond the edge of the card

**3.17****personalized card**

card possessing all the components required for its intended purpose which has been subjected to all personalization and finishing operations that has not been issued to the cardholder

**3.18****operate as intended**

operate in the manner described by the manufacturer's specification in accordance with the applicable standards

**4 Conformance**

An identification card is in conformance with this document if it meets all the mandatory requirements specified herein. Unless otherwise specified, default values apply. Failure to conform to specified criteria should be negotiated between the involved parties.

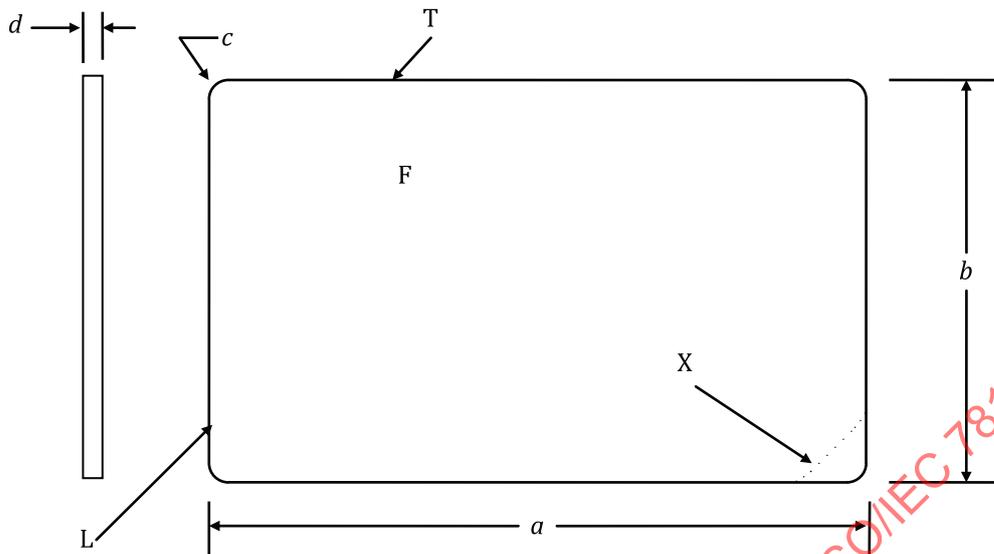
**5 Dimensions of card****5.1 General**

The following dimensions and tolerances apply to cards under the default test environment of  $23\text{ °C} \pm 3\text{ °C}$  ( $73\text{ °F} \pm 5\text{ °F}$ ) and 40 % to 60 % relative humidity.

**5.2 Card dimensions and tolerances**

All points on the edges of the card, except for the rounded corners, shall fall between two concentric, similarly aligned rectangles as defined in [Figure 1](#) for maximum height and width, and minimum height and width. The corners shall be rounded with a radius as specified in [Figure 1](#). One corner of the *ID-000* size card shall have a bevel as shown in [Figure 1](#). Care should be taken to avoid misalignment between the rounded corners and the straight edges of the card. The thickness of a card as defined here applies only to those parts of the card outside of any raised area.

Dimensions in mm (in)



**Key**

- L left edge of card
- T top reference edge of card
- F front of card

- X ID-000 size only  
 $3 \pm 0,1 \times 45^\circ \pm 2^\circ$   
 $(0.118 \pm 0.004 \times 45^\circ \pm 2^\circ)$

Card size	a		b		c		d	
	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum
<b>Unused card requirements</b>								
ID-000	25,10 (0.988)	24,90 (0.980)	15,10 (0.594)	14,90 (0.587)	1,10 (0.043)	0,90 (0.035)	0,84 (0.033)	0,68 (0.027)
ID-1	85,72 (3.375)	85,47 (3.365)	54,03 (2.127)	53,92 (2.123)	3,48 (0.137)	2,88 (0.113)	0,84 (0.033)	0,68 (0.027)
ID-2	105,20 (4.142)	104,80 (4.126)	74,20 (2.921)	73,80 (2.906)	5,00 (0.197)	3,00 (0.118)	0,84 (0.033)	0,68 (0.027)
ID-3	125,20 (4.929)	124,80 (4.913)	88,20 (3.472)	87,80 (3.457)	5,00 (0.197)	3,00 (0.118)	0,84 (0.033)	0,68 (0.027)
<b>Personalized card and returned card requirements</b>								
ID-000	25,20 (0.991)	24,80 (0.972)	15,15 (0.596)	14,84 (0.584)	1,10 (0.043)	0,90 (0.035)	0,84 (0.033)	0,68 (0.027)
ID-1	85,90 (3.382)	85,37 (3.361)	54,18 (2.133)	53,82 (2.119)	3,48 (0.137)	2,88 (0.113)	0,84 (0.033)	0,68 (0.027)
ID-2	105,30 (4.146)	104,80 (4.126)	74,30 (2.925)	73,70 (2.902)	5,00 (0.197)	3,00 (0.118)	0,84 (0.033)	0,68 (0.027)
ID-3	125,30 (4.933)	124,80 (4.913)	88,30 (3.476)	87,70 (3.453)	5,00 (0.197)	3,00 (0.118)	0,84 (0.033)	0,68 (0.027)

**Figure 1 — Card size dimensions**

NOTE 1 The definition of the front of the card is technology dependent. For example, cards supporting either ICC contacts or embossing always have these technologies on the front of the card, and the magnetic stripe always appears on the back of the card. Not all card technologies which use the ISO/IEC 7810 standard need to define the front of the card.

NOTE 2 The ID-000 size card size was first defined by EN 1375-1 and is commonly contained within an ID-1 size card. See [Annex A](#).

### 5.3 Card edges

Edge burrs shall not exceed 0,08 mm (0.003 in) above the card surface.

## 6 Card construction

The card may be made of solid, laminated, or bonded materials, with or without inserts.

## 7 Card materials

The card shall be made of any material fulfilling the requirements of this document. Card insert material may be used. Card inserts are not, however, specified in this document and shall not interfere with other requirements specified in this document.

ID-000, ID-2 and ID-3 size cards shall have the same material properties as ID-1 size cards.

**WARNING — Some materials are sensitive to the effects of plasticizers which may be incorporated in some flexible plastic materials. Identification cards kept in contact with such flexible plastics may degrade the physical properties of the identification card.**

## 8 Card characteristics

### 8.1 Bending stiffness, ID-1 size card only

The bending stiffness of the ID-1 size card shall be such that deformations in normal use (bends not creases) can be removed by the recording or printing device without impairing the function of the card. The deformation which occurs when the card is subjected to the test load as described in ISO/IEC 10373-1 shall be 35 mm (1.38 in) maximum and 13 mm (0.51 in) minimum. The card shall return to within 1,5 mm (0.06 in) of its original flat condition within one minute after the load is removed.

### 8.2 Toxicity

Taking the relevant national and/or regional regulations into consideration, the card shall not, upon normal use or disposal, release unacceptably high levels of regulated metals or other toxic substances. It is the responsibility of the user of this document to conform to the applicable national and/or regional regulations dealing with metals, other elements and toxic substances in the environment.

NOTE Card issuers are encouraged to obtain a list of all materials used within a card construction and demand material certificates, such as RoHS or Safety Data Sheets from the supplier. Card materials include, but are not limited to printing inks, plastic films, IC chips/modules, batteries, magnetic stripe, holograms, adhesives, and transfer films used during personalization.

### 8.3 Resistance to chemicals

The card shall meet the dimensional and warpage requirements, and there shall be no separation of card components after submersion in all short-term solutions for 1 min and after submersion in the acid and alkaline artificial perspiration solutions for 24 h as described in ISO/IEC 10373-1.

## 8.4 Card stability with temperature and humidity

After exposure to the following temperature and relative humidity:

- Temperature: -35 °C to +50 °C (-31 °F to +122 °F)
- Relative humidity: 5 % to 95 %

The card shall operate as intended and the structural reliability shall remain in compliance for dimensions and warpage, as specified in [Clause 5](#) and [8.10](#) except for the ID-000 size card. A different temperature range may be specified in another clause or standard, or by mutual agreement between the supplier and the card purchaser.

## 8.5 Light

The card and its printing shall resist deterioration from exposure to light encountered during normal use.

A minimum robustness against ambient light may be specified in another clause or standard, or by mutual agreement between the supplier and card purchaser. In such a case, the robustness of the card against ambient light shall be evaluated using the test method defined in ISO/IEC 24789-2.

## 8.6 Durability

Durability of the card is not established in this document. It is based on a mutual agreement between the card purchaser and the supplier.

NOTE ISO/IEC 24789-2 contains durability tests.

## 8.7 Peel strength

Component layers of material that form the card structure shall be bonded to the extent that any layer shall possess a minimum peel strength of 0,35 N/mm (2 lbf/in). Patch layers shall be bonded with a minimum peel strength of 0,25 N/mm (1.4 lbf/in). In addition:

- If layers are inseparable, the result is automatically deemed acceptable.
- If a layer tears before obtaining measurable peel data, this signifies that the bond is stronger than the layer, which is automatically deemed acceptable.
- If a layer tears after recording measurable peel data, the measurable peel value shall be used for compliance.

NOTE The issuer is warned that the card's artwork design can influence lamination bond strength. Certain printing inks or embedded elements can prevent the card from meeting the delamination requirement. The peel angle for this measurement is 90°, as described in ISO/IEC 10373-1.

## 8.8 Adhesion or blocking

When cards are stacked together, the cards shall be easily separated by hand and shall show no adverse effects such as:

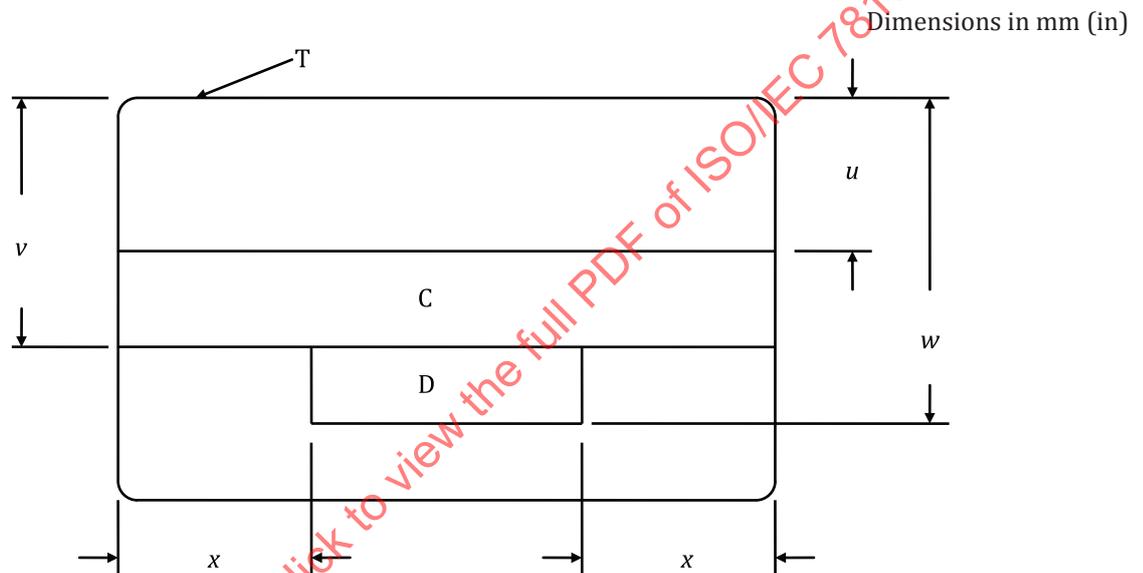
- a) delamination;
- b) discolouration or colour transfer;
- c) changes to surface finish;
- d) transfer of material from one card to another;
- e) deformation.

### 8.9 Opacity, ID-1 size card only

All machine-readable cards shall have the ability to block infrared wavelength light through the card to the extent as shown in the equations below. The current through the test sensor shall be less when the card is positioned between the source and sensor ( $I_{\text{card}}$ ) than when the opacity reference is positioned between the source and sensor ( $I_{\text{ref}}$ ). See ISO/IEC 10373-1 for compliance test procedures. Area C and area D as shown in [Figure 2](#) may be optically transparent and do not have a specified optical transmission density.

$$\frac{I_{\text{card}} \text{ at } 860 \text{ nm}}{I_{\text{ref}} \text{ at } 860 \text{ nm}} < 1 \quad \text{AND} \quad \frac{I_{\text{card}} \text{ at } 950 \text{ nm}}{I_{\text{ref}} \text{ at } 950 \text{ nm}} < 1$$

NOTE This characteristic is required for applications in which the presence of a card is detected by its attenuation of IR light transmitted between a source and a sensor.



#### Key

T	top reference edge of card	u	21 (0.827) minimum
C	area C	v	33 (1.300) maximum
D	area D	w	44 (1.731) maximum
		x	20 (0.787) minimum

Figure 2 — Areas (C and D) on ID-1 size cards with no specified opacity

### 8.10 Overall card warpage, ID-1 size card only

The maximum distance from a flat rigid plate to any portion of the convex surface of an ID-1 size card shall not be greater than 1,5 mm (0.06 in) including the card thickness.

NOTE Card warpage for embossed cards is given in ISO/IEC 7811-1.

### 8.11 Resistance to heat, ID-1 size card only

The ID-1 size card shall not show a deflection greater than 10 mm (0.4 in), delamination, or discolouration after exposure to a temperature and humidity of  $50\text{ °C} \pm 1\text{ °C}$  ( $122\text{ °F} \pm 2\text{ °F}$ ) and less than 60 % RH for 4 h according to ISO/IEC 10373-1.

## 8.12 Surface distortions, raised and depressed areas

Raised areas shall not increase the overall card thickness by more than 0,10 mm (0.004 in) except for those defined in ISO/IEC 7811-1 and ISO/IEC 7811-9 measured relative to the adjacent card surface. Depressed areas shall not decrease the overall card thickness by more than 0,10 mm (0.004 in).

NOTE 1 Scratching or marking of a signature panel can occur in some card processing devices.

NOTE 2 Surface profile of IC card contacts is defined in ISO/IEC 7816-1.

NOTE 3 Other standards can define further restrictions on the geometry of raised areas.

**WARNING — For cards which are printed after embedding, problems can be encountered when contacts are above the adjacent surface of the card.**

## 8.13 Contamination and interaction of card components

The card material and any material added to the card shall not contaminate the card processing and interface devices which write and read the card. The card material shall not contain elements which might migrate into and modify other components of the card to such an extent that, during normal use of the card, this material is likely to become incapable of meeting the characteristics specified for it in this document for identification cards.

The conductivity and dielectric properties of materials and coatings used in the card structure can have an effect on the electrical behavior of the card (for example static electricity). This behavior should not adversely affect the card, card processing equipment or interface devices.

NOTE Card equipment and interface device manufacturers are encouraged to provide resistance to ESD (electrostatic discharge) from cards or card users that have voltage potential.

## 8.14 Dynamic bending stress, ID-1 size card only

When subjected to a total of 1000 bending cycles, the card shall continue to operate as intended and shall not show any cracked part after testing the card in accordance with the test methods described in ISO/IEC 10373-1.

# 9 Criteria for cards containing IC's

## 9.1 General

The following characteristics only apply to cards containing IC's. The following requirements are based on ISO/IEC 7816-1, ISO/IEC 14443-1, and ISO/IEC 15693-1. Specific content in this document represents the most current information and can be different from the same requirement defined by one of these 3 standards.

NOTE The following requirements have been consolidated here from ISO/IEC 7816-1, ISO/IEC 14443-1, and ISO/IEC 15693-1. It is expected that future revisions of ISO/IEC 7816-1, ISO/IEC 14443-1, and ISO/IEC 15693-1 will remove the (now) duplicate requirements in those standards.

## 9.2 X-rays

The card shall continue to operate as intended after exposure of any card surface to medium-energy X-radiation as described in the test methods in ISO/IEC 10373-1. The radiation dose shall be at 0,1 Gy per exposure.

### 9.3 Static electricity

#### 9.3.1 IC cards with contacts

The card shall not be damaged in normal use by a person charged with static electricity.

The performance of the card shall not be degraded by exposure to a static discharge in accordance with the test methods described in ISO/IEC 10373-1 between any contact connected to electronics inside the card and ground of a voltage of 4 kV.

#### 9.3.2 Contactless IC cards

The card shall continue to operate as intended after testing in accordance with the static electricity test methods described in ISO/IEC 10373-1 with a test voltage of 6 kV.

### 9.4 Operating temperature

The card shall operate as intended over an ambient temperature range of 0 °C to 50 °C (32 °F to 122 °F).

### 9.5 Mechanical strength

#### 9.5.1 General

The card shall resist damage to its surface and to any components contained in it and remain intact during normal use, storage and handling.

#### 9.5.2 Mechanical strength of cards with contacts (3 wheel test, ID-1 size card only)

This requirement applies to cards where the electronics are located behind the contacts. The card shall continue to operate as intended after testing the card in accordance with the test method described in ISO/IEC 10373-1 (3 wheel test) for 50 cycles on each side (front and back) with a force of 8 N.

#### 9.5.3 Mechanical strength of contacts

Each contact surface and contact area (entire galvanic surface) shall not be damaged by a working pressure equivalent to a steel ball of diameter 1 mm (0.039 in) applying a force of 1,5 N.

### 9.6 Electrical surface resistance of contacts

When a DC current of any value between 50  $\mu$ A and 100 mA is applied, the surface resistance between any two points on the same contact pad shall not exceed 500 m $\Omega$  at a distance of 1,5 mm (0.059 in) between contact points. The contact pad area shall be as defined in ISO/IEC 7816-2.

### 9.7 IC and magnetic stripe electromagnetic interference

If the card carries a magnetic stripe, the IC card shall not be damaged, malfunction or be altered after reading, writing or erasing of the magnetic stripe. Conversely, the writing or reading of the integrated circuit(s) shall not cause a malfunction of the magnetic stripe or its associated reading, writing or handling mechanisms.

### 9.8 Resistance to chemicals

Cards with exposed contacts shall continue to operate as intended after exposure to salt mist as defined in ISO/IEC 10373-1. Any exposed contact shall continue to comply with the requirements in [9.6](#) after any of the chemical exposures.

### 9.9 Antenna for contactless interface (ID-1 size card only)

If an ISO/IEC 14443-1 Class 2 antenna is integrated into an ID-1 size card, the Class 2 antenna area specified in ISO/IEC 14443-1:2018, Annex A should be located outside of the embossing areas defined in ISO/IEC 7811-1 and ISO/IEC 7811-9. Regardless of the type of antenna used, if it is located inside an embossing area, special care shall be taken that possible later embossing in the embossing area does not adversely affect the performance of the antenna.

### 9.10 Resistance to temperature and humidity

Any exposed contact shall continue to comply with the requirements in [9.6](#) after exposure to the conditions specified in [8.4](#).

### 9.11 Dynamic torsion stress, ID-1 size card only

When subjected to a total of 1000 torsion cycles, the card shall continue to operate as intended and shall not show any cracked part after testing in accordance with the test methods described in ISO/IEC 10373-1.

## 10 Card interface devices

### 10.1 General

The following requirements do not apply to cards.

### 10.2 ESD robustness

A card interface device shall continue to operate as intended following a discharge in accordance with IEC 61000-4-2 into any part of the device that might become exposed to any part of the surface of a card while the card could be in contact with the cardholder. The discharge voltage for the test shall be 8 kV.