
**Identification cards — ICC-managed
devices —**

**Part 2:
Physical characteristics and test
methods for cards with devices**

*Cartes d'identification — Dispositifs contrôlés par carte à circuit
intégré (ICC) —*

*Partie 2: Caractéristiques physiques et méthodes d'essai des cartes
avec les dispositifs*

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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).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/IEC JTC 1, *Information technology, SC 17, Cards and personal identification*.

ISO/IEC 18328 consists of the following parts, under the general title *Identification cards — ICC-managed devices*:

- *Part 1: General framework*
- *Part 2: Physical characteristics and test methods for cards with devices*
- *Part 3: Organization, security and commands for interchange*

Identification cards — ICC-managed devices —

Part 2:

Physical characteristics and test methods for cards with devices

1 Scope

This part of ISO/IEC 18328 defines physical characteristics and test methods for cards with devices, including but not limited to power supplying devices, displays, sensors, microphones, loudspeakers, buttons or keypads. This part of ISO/IEC 18328 also covers aspects of coexistence of technologies of devices on the card and other machine readable card technologies.

Additional requirements related to biometric capture devices are defined in ISO/IEC 17839-2. Such requirements may be applied in addition to the ones defined in this part of ISO/IEC 18328.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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, *Identification cards — Physical characteristics*

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

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

ISO/IEC 17839-2¹⁾, *Identification cards — Biometric system on card — Part 2: Physical characteristics*

ISO/IEC 18328-1¹⁾, *Identification cards — ICC-managed devices — Part 1: General framework*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 7810, ISO/IEC 18328-1 and the following apply.

3.1 active display area

area of the display that has active dots or segments

Note 1 to entry: The *total display area* typically extends beyond the active display area.

3.2

zone 1

<zones of a display> total display area excluding the active display area

1) To be published.

3.2.2

zone 2

<zones of a display> active display area

4 Abbreviated terms

LED Light-emitting diode

OLED Organic light-emitting diode

5 Requirements

5.1 General requirements

5.1.1 Integrated circuit cards (ICCs)

ICCs with integrated devices shall comply with the requirements defined for ID-1 cards as specified in ISO/IEC 7810, in particular regarding the following:

- card dimensions and tolerances;
- bending stiffness;
- peel strength;
- overall card warpage;
- card dimensional stability and warpage with temperature and humidity;
- resistance to chemicals;
- opacity.

Guidance about the co-existence of different technologies on such cards is given in [Annex B](#). A description of different display and input element technologies is provided in [Annex C](#).

5.1.2 ICCs with contacts

ICCs with contacts shall in addition meet the requirements specified in ISO/IEC 7816-1 regarding the following:

- mechanical strength;
- electrical resistance of contacts;
- electromagnetic interference.

5.1.3 Contactless ICCs

Contactless ICCs shall in addition meet the requirement specified in ISO/IEC 14443-1 regarding the antenna location.

5.2 Requirements for ICCs containing displays

5.2.1 General requirements

The following requirements apply to ICCs containing electronic displays.

NOTE 1 Today, there is no stable state-of-the-art regarding the technology of card displays or the correlation between legibility of displays and their functional performance. The requirements described in this part of ISO/IEC 18328 should be considered as preliminary. The detailed requirements for ICCs containing electronic displays depend on the specific use-case.

ICCs containing electronic displays meet the test requirements if the optical contrast is not less than a defined percentage of the optical contrast immediately before the test, as specified by the application.

NOTE 2 Readability and contrast: An observer's ability to perceive the information from an electronic display depends on two major factors. These are (a) size and font of the displayed information in relationship to the viewing position and (b) the optical contrast of the displayed information to the surrounding environment. Optical contrast is the comparison of the brightness or sterance of the display to the brightness of the surrounding environment. High readability results by optimizing specific contrast ratios.

5.2.2 Requirements for matrix displays

In addition to the test requirements in 5.2.1, for ICCs with matrix displays, it is required that not less than a defined percentage of all pixels remain functional after the test, as specified by the application.

5.2.3 Requirements for segmented displays

In addition to the test requirements in 5.2.1, for ICCs with segmented displays, no segment failure (dead segment) is allowed, i.e. after the test all segments should be working in both directions from white to black and from black to white.

- Dead spots in zone 1 (i.e. outside the active display area) can be accepted.
- Dead spots in zone 2 (i.e. within the active display area) can be accepted if their size and number are lower than values specified by the application.

5.3 Requirements for cards containing biometric capture devices

ICCs that embed a biometric capture device may be required to conform to requirements in ISO/IEC 17839-2, in addition to the mandatory requirements of this part of ISO/IEC 18328. [Annex A](#) gives an example of an alternative card size.

Annex A (informative)

ID-T size card

A.1 General

ID-T size cards are the same length and width as a normal ID-1 size card but are thicker.

The additional thickness is required for an interim period of time to accommodate electronic card components used for biometric capture devices. This card format is intended to accommodate certain restrictions of current manufacturing technology. The need for this Annex will be reviewed as part of the next revision of this part of ISO/IEC 18328.

ID-T size cards are not intended for use with any type of insertion reader typically used with an ID-1 size card such as for magnetic stripe or ICC contact readers. This Annex specifies physical characteristics for a thicker card if it is used.

A.2 Conformance

ID-T size cards are made from similar materials as ID-1 size cards and meet all requirements given in ISO/IEC 7810 for ID-1 size cards except as noted in this Annex.

NOTE Dynamic bending stress and dynamic torsional stress in ISO/IEC 7810 apply only to ID-1 size cards.

A.3 Terms and definitions

A.3.1

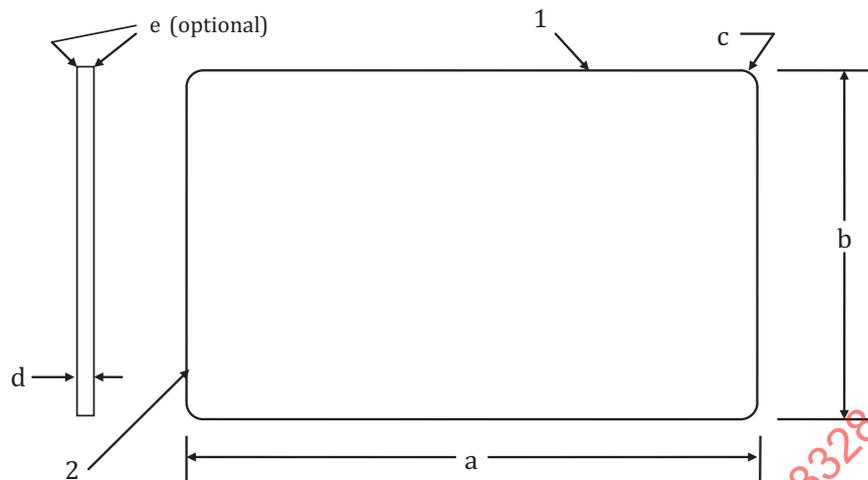
ID-T

nominally 85,60 mm (3,370 in) wide by 53,98 mm (2,125 in) high by 2,5 mm (0,098 in) thick

A.4 Dimensions

- Dimensions a, b and c (see [Figure A.1](#)) shall be as defined for an ID-1 size card.
- Dimension d shall be $2,5 \pm 0,2$ mm.
- Dimension e (optional radius all around the perimeter of the card).

NOTE The addition of an optional $0,3 \pm 0,1$ mm radius, e, is recommended. Adding such a radius will make it easier to slide this thicker card into a wallet card holder.

**Key**

- 1 top reference edge
- 2 left edge

Figure A.1 — ID-T size card dimensions

A.5 Bending stiffness

The bending stiffness of the ID-T 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 4 mm (0,157 in) maximum. The card shall return to within 0,3 mm (0,012 in) of its original flat condition within one minute after the load is removed.

A.6 Overall card warpage

The maximum distance from a flat rigid plate to any portion of the convex surface of an ID-T size card shall not be greater than 3,2 mm (0,126 in) including the card thickness.

Annex B (informative)

Coexistence of new devices with existing technologies

B.1 General

This informative Annex defines the conditions under which new devices can coexist with other machine readable card technologies.

B.2 References

For the purposes of this Annex, the following references apply. 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, *Identification cards — Physical characteristics*

ISO/IEC 7811-1, *Identification cards — Recording technique — Part 1: Embossing*

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 7811-7, *Identification cards — Recording technique — Part 7: Magnetic stripe — High coercivity, high density*

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

ISO/IEC 7811-9, *Identification cards — Recording technique — Part 9: Tactile identifier mark*

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 11693-1, *Identification cards — Optical memory cards — Part 1: General characteristics*

ISO/IEC 11693-2, *Identification cards — Optical memory cards — Part 2: Co-existence of optical memory with other machine readable technologies*

ISO/IEC 11694-2, *Identification cards — Optical memory cards — Linear recording method — Part 2: Dimensions and location of the accessible optical area*

ISO/IEC 11695-2, *Identification cards — Optical memory cards — Holographic recording method — Part 2: Dimensions and location of accessible optical area*

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

ISO/IEC 15693-1, *Identification cards — Contactless integrated circuit cards — Vicinity cards — Part 1: Physical characteristics*

ISO/IEC 17839-2, *Information technology — Identification cards — Biometric system on card — Part 2: Physical characteristics*

ISO/IEC 18013-1, *Information technology — Personal identification — ISO-compliant driving licence — Part 1: Physical characteristics and basic data set*

B.3 Terms and definitions

For the purposes of this Annex, the terms and definitions given in ISO/IEC 18328-1 and the following terms and definitions apply.

B.3.1 machine readable zone MRZ

fixed dimensional area located on an identity card, containing mandatory and optional data formatted for machine reading using optical character recognition (OCR) methods

B.3.2 new device

device to be integrated in the card, except for existing technology described in [B.4.1](#), e.g., displays, sensors, microphones, loudspeaker, buttons and keypads

B.4 General structure

B.4.1 Technology combinations

This part of ISO/IEC 18328 provides informative details to assist ICC manufacturers and issuers in achieving a coexistence of new devices and existing machine readable technologies on the surface or within the structure of ICCs complying with the requirements of the ISO/IEC 18328- series.

Numerous combinations of technology are possible. This informative Annex describes the combination of new devices with the following:

- embossing;
- magnetic stripe;
- contacts for ICC;
- antenna for contactless ICC;
- optical memory area;
- biometric capture device;
- Machine Readable Zone (MRZ).

Each assigned location of each technology in relation to new devices is defined. In all cases, each technology should be located according to its own applicable standards.

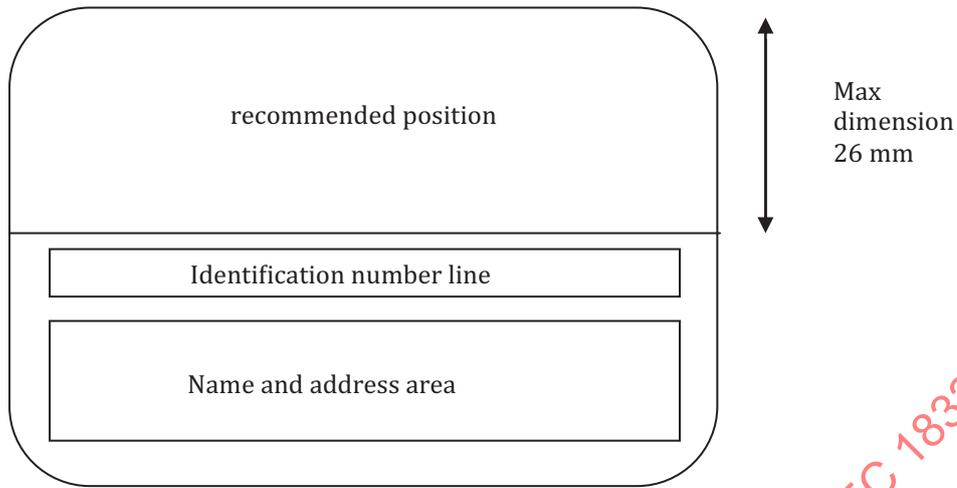
B.4.1.1 Embossing

When a new device is combined with embossing, the layout of the card should be as shown in [Figure B.1](#).

The location and dimensions of the embossing should comply with ISO/IEC 7811-1.

When the technology used to form the raised areas causes a physical deformation of the card such as mechanical embossing, then special care should be taken that such deformation of the card does not

adversely affect the required characteristics of the contained components for new devices. A minimum distance of 3 mm between the contained new devices and any deformed part of the card is recommended.



NOTE Refer to ISO/IEC 7811-1 for details.

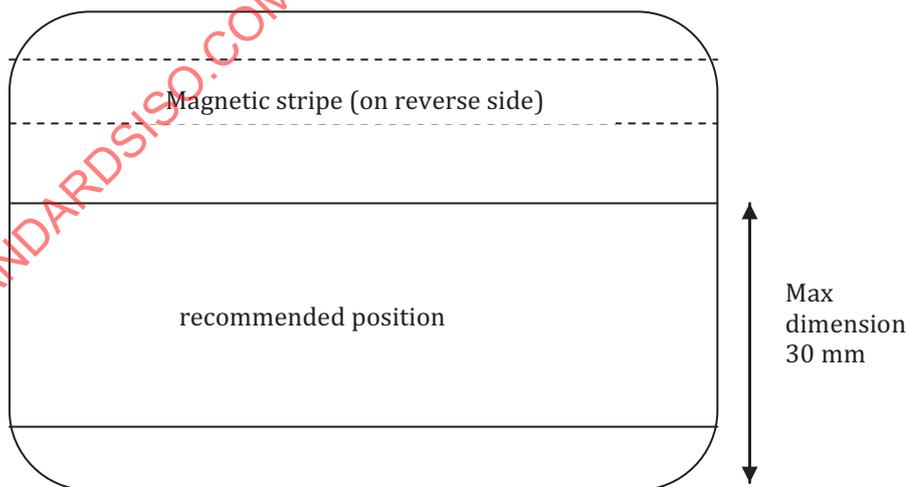
Figure B.1 — Coexistence of new technologies with embossing

B.4.1.2 Magnetic stripe

When a new device is combined with a magnetic stripe, the layout of the card should be as shown in [Figure B.2](#).

The location and dimensions of the magnetic stripe should comply with ISO/IEC 7811-2, ISO/IEC 7811-6, ISO/IEC 7811-7 and ISO/IEC 7811-8.

It is possible to position the device on the opposite side of the magnetic stripe (i.e. the front surface). In this case, the device should not affect reading or writing of the magnetic data. The device should satisfy the surface profile, warpage, and surface distortion requirements as defined in the respective parts of ISO/IEC 7811.



NOTE Refer to ISO/IEC 7811-2, ISO/IEC 7811-6, ISO/IEC 7811-7, and ISO/IEC 7811-8 for details.

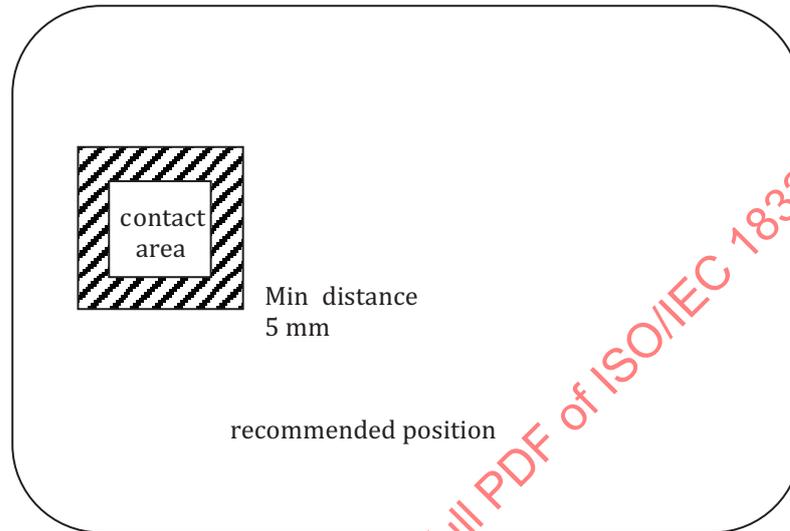
Figure B.2 — Coexistence of new technologies with magnetic stripe

B.4.1.3 Contacts for ICC

When a new device is combined with an ICC with contacts, the layout of the card should be as shown in [Figure B.3](#). A minimum distance of e.g. 5 mm between the new device and the contact area is recommended.

The location of the contacts should comply with ISO/IEC 7816-2.

It is possible to position the device opposite side of the contacts (i.e., the back surface). In this case, the device should not affect the physical and electrical characteristics of the contacts.



NOTE Refer to ISO/IEC 7816-1 and ISO/IEC 7816-2 for details.

Figure B.3 — Coexistence of new technologies with contacts for ICC

B.4.1.4 Antenna for contactless ICC

When a new device is combined with a contactless ICC, the new device should not affect the electrical and electromagnetic coupling characteristics of the antenna. The antenna location varies; refer to ISO/IEC 14443-1 and ISO/IEC 15693-1 for details.

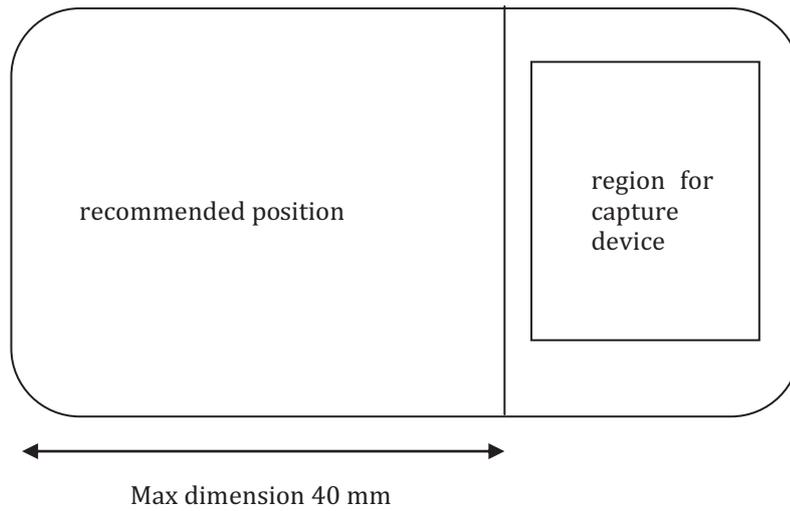
B.4.1.5 Optical memory area

When a new device is combined with an optical memory, the new device should not affect the optical memory area. The optical memory area varies; refer to ISO/IEC 11693-1, ISO/IEC 11693-2, ISO/IEC 11694-2, ISO/IEC 11695-2 series for details.

B.4.1.6 Biometric capture device

When a new device is combined with a biometric capture device, the layout of the card should be as shown in [Figure B.4](#).

The location of the biometrics capture device should comply with ISO/IEC 17839-2. The position of the capture devices is subject to ergonomic requirements and other reserved areas of the card body for active components.



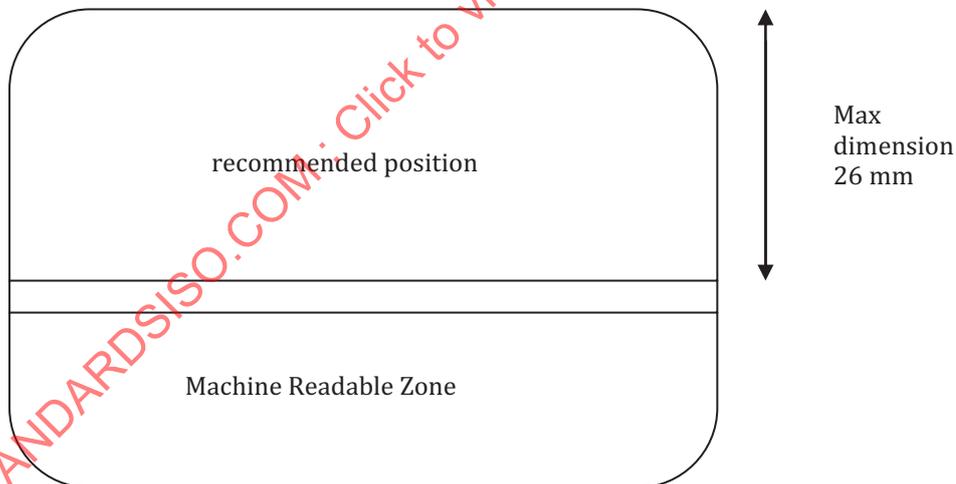
NOTE Refer to ISO/IEC 17839-2 for details.

Figure B.4 — Coexistence of new technologies with biometric capture device

B.4.1.7 Machine readable zone (MRZ)

When a new device is combined with a MRZ, the layout of the back of the card should be as shown in [Figure B.5](#).

The location and dimensions of the MRZ should comply with ISO/IEC 18013-1.



NOTE 1 Refer to ISO/IEC 18013-2 for details.

NOTE 2 [Figure B.5](#) refers to one specific example of an MRZ. Different layouts exist and different requirements can apply to specific cards.

Figure B.5 — Coexistence of new technologies with MRZ