
**Identification cards — Optical
memory cards —**

**Part 3:
Authentication techniques**

Cartes d'identification — Cartes à mémoire optique —

Partie 3: Techniques d'authentification

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ISO/IEC 11693-3:2015

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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).

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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*, Subcommittee SC 17, *Cards and Personal Identification*.

ISO/IEC 11693 consists of the following parts, under the general title *Identification cards — Optical memory cards*:

- *Part 1: General characteristics*
- *Part 2: Co-existence with other machine readable technologies*
- *Part 3: Authentication techniques*

Introduction

This part of ISO/IEC 11693 is one of a series of International Standards defining the parameters for authentication technology for optical memory cards.

This part of ISO/IEC 11693 is specific to authentication techniques for memory cards using the holographic and linear recording methods. Characteristics which apply to other specific recording methods are found in separate Standards documents.

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of patents.

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Identification cards — Optical memory cards —

Part 3: Authentication techniques

1 Scope

This part of ISO/IEC 11693 defines the authentication techniques.

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

ISO/IEC 10737-5, *Identification cards — Test methods — Part 5: Optical memory cards*

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

ISO/IEC 11694-3, *Identification cards — Optical memory cards — Linear recording method — Part 3: Optical properties and characteristics*

ISO/IEC 11694-4, *Identification cards — Optical memory cards — Linear recording method — Part 4: Logical data structures*

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

ISO/IEC 11695-3, *Identification cards — Optical memory cards — Holographic recording method — Part 3: Optical properties and characteristics*

ISO/IEC 11695-4, *Identification cards — Optical memory cards — Holographic recording method — Part 4: 3.3*

3 Terms and Definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11693-1, ISO/IEC 11693-2, and the following apply.

3.1 reflectivity

ratio of reflected light to the light incident at a specified wavelength measured at a normal incidence on the optical memory card

Note 1 to entry: Reflectivity is generally expressed as a percentage.

**3.2
scattering**

deviation of reflected radiation from the angle predicted by the law of reflection.

Note 1 to entry: Reflections that undergo scattering are called *diffuse* reflections. Diffuse reflections are measured by means of an integration sphere, while properly averaging over all angles of illumination and observation.

**3.3
optical resolution**

ability of the storage material to resolve physical details by optical means

Note 1 to entry: The (spatial) resolution is typically expressed in line pairs per millimetre.

**3.4
diffraction**

effect occurring when light is incident on an optical structure, the light is diffracted in discrete directions, called diffraction orders

**3.5
diffraction efficiency**

relation of the power of the diffracted light beam, P_{diff} , to the incident power of the readout beam, P_{inc} :

$$\eta = \frac{P_{\text{diff}}}{P_{\text{inc}}}$$

Note 1 to entry: The diffraction efficiency is dependent upon the holographic storage medium. It varies between 1 % and 100 %.

**3.6
diffraction grating**

device having periodic variations of reflectivity and/or refractive index and/or optical path length

**3.7
read power**

laser power used to read-out information from the accessible optical area

**3.8
authentication element**

user defined feature integral to the accessible optical area which is appropriate to the specified authentication technique

4 Authentication techniques

Authentication techniques are based upon the use of an authentication element integral to the optical medium; see the existing standards ISO/IEC 11694-3 and ISO/IEC 11695-3.

5 Physical characteristics of authentication elements

5.1 Dimensions

The dimension of the authentication element is user defined in compliance with accessible optical area as specified in ISO/IEC 11693-2. A minimum area of $a \times b$, whereas $a = 10 \text{ mm}$ and $b = 10 \text{ mm}$ is recommended.

5.2 Technology combinations

Numerous combinations of technology are possible; see ISO/IEC 11693-2.

5.3 Card construction

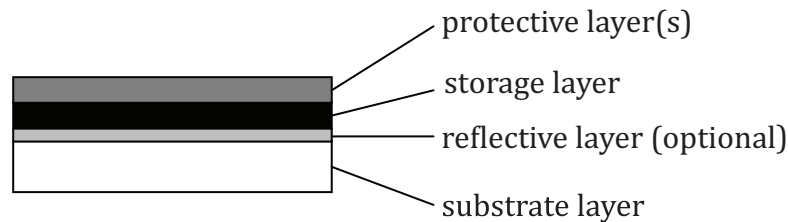
ISO/IEC 7810 applies.

5.4 Cross section at accessible optical area

See [Figure 1](#).

The accessible optical area contains an area that is reserved for the authentication element.

The authentication element is composed of different layers: which can include an adhesive layer, a substrate layer, a reflective layer, a storage layer and one or more protective layers to protect the sub-layers from damage e.g. by surface damage, humidity and other environmental influence. In the simplest configuration only a storage layer is required.



NOTE Drawing not to scale.

Figure 1 — Cross-section of the authentication element for optical memory cards

Authentication elements are laminated, coated, or glued onto the card surface or inserted into the card body.

5.4.1 Protective layer(s)

There is one or multiple protective layer(s) to protect the sub-layers (storage layer, reflective layer) from surface damage, humidity and other environmental influence.

The protective layer shall be transparent to the writing and reading beam.

When using a reading or writing beam with linear or circular polarization, the protective layer shall be free of birefringence.

The protective layer ensures that the authentication element can survive the action of a destructive influence to the extent that it continues to show optical characteristics which conform to the base standard.

5.4.2 Storage layer

The storage layer is a photosensitive material applied to the reflective or substrate layers. Examples of materials, which can be used are:

- high-resolution photographic silver-halide film;
- silver-halide sensitized gelatin;
- dichromated gelatin;
- photoresists;
- photopolymers;
- functionalized liquid crystalline polymers;
- metal films;