



SLOVENSKI STANDARD

SIST EN 753-2:1998

01-junij-1998

Identification card systems - Intersector thin flexible cards - Part 2: Magnetic recording technique

Identification card systems - Intersector thin flexible cards - Part 2: Magnetic recording technique

Identifikationskartensysteme - Branchenübergreifende dünne biegsame Karten - Teil 2: Magnetische Aufzeichnungstechnik

Systemes de cartes d'identification - Cartes souples minces intersectorielles - Partie 2: Technique d'enregistrement magnétique

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Ta slovenski standard je istoveten z: EN 753-2:1997

ICS:

35.240.15	Identifikacijske kartice in sorodne naprave	Identification cards and related devices
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EUROPEAN STANDARD

EN 753-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 1997

ICS 35.240.15

Descriptors: identification cards, magnetic cards, specifications, physical properties, magnetic properties, magnetic records, magnetic tapes, codification

English version

**Identification card systems - Intersector thin
flexible cards - Part 2: Magnetic recording
technique**

isteh STANDARD PREVIEW
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Systèmes de cartes d'identification - Cartes
souples minces intersectorielles - Partie 2:
Technique d'enregistrement magnétique

Identifikationskartensysteme -
Branchenübergreifende dünne biegsame Karten -
Teil 2: Magnetische Aufzeichnungstechnik

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 224 "Machine-readable cards, related device interfaces and operations", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.

This European Standard is one of a series of standards, under the general title "Identification card systems - Intersector thin flexible cards" and the different parts are the following :

- Part 1 : General technical specifications ;
- Part 2 : Magnetic recording technique ;
- Part 3 : Test methods.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

Thin flexible cards (TFCs), the subject of this European Standard, 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.

The cards are made from various materials, on which can be deposited a regular and continuous coating of magnetic material to form a stripe. The recording technique permits the storage of data on a single or multiple tracks located within the magnetic stripe specified herein.

1 Scope

This part of EN 753 specifies the magnetic stripe and encoding characteristics of thin flexible cards. Other cards, for example ID-1 cards, do not come within its scope.

Guidance concerning the storage and usage of finished cards (including magnetic stripe cards) under various environmental conditions is given in EN 753-1.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 753-1:1997	Identification card systems - Intersector thin flexible cards - Part 1 : General technical specifications
prEN 753-3	Identification card systems -Intersector thin flexible cards - Part 3 : Test methods
ISO 4287-1	Surface roughness - Terminology - Part 1: Surface and its parameters
ISO 4287-2	Surface roughness - Terminology - Part 2: Measurement of surface roughness parameters
IEC 50(221)	International Electrotechnical Vocabulary - Chapter 221: Magnetic materials and components

3 Definitions

For the purposes of this standard, the following definitions apply :

3.1 average signal amplitude (U_A): The arithmetic mean of the absolute values of the individual signal amplitudes found in a readback waveform.

$$U_A = \frac{\sum_{k=1}^n U_{ik}}{n} \quad (\text{where } n \text{ is the number of individual signal amplitudes})$$

Five such values are specified in EN 753-2 :

- U_{A1} : average value after recording at D_{\min} and I_{\min} ;
- U_{A2} : average value after recording at D_{\min} and I_{\max} ;
- U_{A3} : average value after recording at D_{\max} and I_{\max} ;
- U_{A4} : average value after recording at D_{\min} and I_{\max} then erasing at I_{\min} ;
- U_{A5} : average value after recording at D_{\max} and I_{\min} then erasing at $d \cdot I_R$.

3.2 back : The face of the card opposite the front.

3.3 central stripe : A stripe centred on the widthwise axis of the card.

3.4 coercive field strength : The magnetic field strength for which the magnetisation is zero [IEC 50 (221)].

3.5 coercivity (H_{cM}) : The value of coercive field strength obtained when the material is brought from saturation by a monotonically changing field [IEC 50 (221)].

3.6 erase noise level : The level of the noise signal which is read from an erased magnetic stripe. EN 753-2 controls erase noise level via the quantities U_{A4} and U_{i4} .

3.7 erasure : The attenuation of a magnetic encoding signal by re-magnetising the track area in a single direction, parallel to the width of the stripe.

3.8 finished card : A card at the point of issue to the public.

3.9 front : The reference face of the card (which normally bears printed information relating to its origin and ownership).

3.10 heavy usage : A class of TFC able to withstand up to 2 500 transaction cycles.

3.11 height : The dimension parallel to the shortest edge of the card.

3.12 high coercivity (HiCo) : Coercivity values around 270 kA.m⁻¹; magnetic stripes whose magnetic characteristics conform to those given in EN 753-2 for class *H* magnetics.

3.13 individual signal amplitude (U_i) : The base to peak amplitude of a single readback signal pulse. Four such quantities are specified in EN 753-2 :

- U_{i1} : maximum value after recording at D_{\min} and I_{\min} ;
- U_{i2} : range of values after recording at D_{\max} and I_{\max} ;

- U_{i4} : maximum value after recording at D_{\min} and I_{\max} then erasing at I_{\min} ;
- U_{i5} : minimum value after recording at D_{\max} and I_{\min} then erasing at $d \cdot I_R$.

3.14 lateral stripe : Any widthwise stripe which is not centred on the widthwise axis of the card.

3.15 light usage : A class of TFC able to withstand up to 50 transaction cycles.

3.16 low coercivity (LoCo) : Coercivity values around $25 \text{ kA} \cdot \text{m}^{-1}$; magnetic stripes whose magnetic characteristics conform to those given in EN 753-2 for class L magnetics.

3.17 lower density (LD) : The range of encoding densities given in EN 753-2 for class w encoding ($\leq 3 \text{ bits/mm}$).

3.18 maximum field (H_{\max}) : The test field at which saturation characteristics of magnetic stripes are specified in EN 753. Different values of H_{\max} are used in accordance with the class of magnetics (see prEN 753-3).

3.19 maximum test current (I_{\max}) : The upper of two test write currents used for testing TFC magnetic stripes.

3.20 maximum test density (D_{\max}) : The upper of two test recording densities used for testing TFC magnetic stripes.

3.21 medium usage : A class of TFC able to withstand up to 500 transaction cycles.

3.22 minimum test current (I_{\min}) : The lower of the two test write currents used for testing TFC magnetic stripes.

3.23 minimum test density (D_{\min}) : The lower of two test recording densities used for testing TFC magnetic stripes.

3.24 modulation : The range of variation of a readback signal. EN 753-2 controls modulation via the quantities U_{i2} and U_{A3} .

$$\text{modulation} = \frac{U_{i2(\max)} - U_{i2(\min)}}{2 \cdot U_{A3}}$$

3.25 overwrite; overwriting : A measure of the degree to which a signal is attenuated by the encoding of a new signal on the same track.

3.26 recording technique : Any technique used to store data on the card, such as magnetic or optical encoding etc.

3.27 reference edges : Datum edges for dimensioning and orientation, having a fixed relationship to the front of the card. [EN 753-1:1997].

3.28 reference flux (F_R) : The flux in the test write head when the write current is I_R .

3.29 reference signal amplitude (U_R) : The primary standard readback signal amplitude, it is the maximum value of the average signal amplitude of the reference card, corrected to the primary standard (see prEN 753-3). The reference signal amplitude is used to calibrate the readback signal amplitude scale for the measurements required by EN 753-2 and prEN 753-3.

3.30 reference write current (I_R) : The primary standard write current, obtained from the secondary reference card by measurement. The reference write current is used to calibrate the write current scale for the measurements required by EN 753-2 and prEN 753-3.

3.31 resistance to erasure : A measure of the strength of magnetic field required to erase the signal from a magnetic stripe. EN 753-2 controls resistance to erasure via the quantities U_{A5} and U_{i5} .

3.32 resolution : The ability of a magnetic stripe to support high density (short wavelength) recording. EN 753-2 controls resolution via the quantity U_{A3} .

3.33 special magnetics : Magnetic characteristics which conform to those given in EN 753-2 for class S magnetics; a reduced signal level form of class L.

3.34 squareness (SQ) : The ratio of the value of magnetisation (M) at zero magnetic field ($H=0$) to that at H_{max} .

3.35 switching field distribution (SFD) : The width, at half height, of the differentiated saturation $M=f(H)$ characteristic (divided by the field value midway between the two half-height points).

3.36 track : The area of stripe surface occupied by the data encoded by a single channel of the magnetic recording write/read interface.

3.37 upper density (UD) : The range of encoding densities given in EN 753-2 for class p encoding (> 3 bits/mm).

3.38 usage (class of TFC) : The number of transaction cycles which the particular class of TFC is required to withstand in normal operation.

3.39 very high coercivity : Coercivity values above 400 kA.m^{-1} ; magnetic stripes whose magnetic characteristics conform to those given in EN 753-2 for class V magnetics.

3.40 width : The dimension parallel to the longest edge of the card.

4 Symbols and abbreviations

D_{max}	maximum test density
D_{min}	minimum test density
F_R	reference flux
H_{cM}	coercivity
H_{max}	maximum field

I_{max}	maximum test current
I_{min}	minimum test current
I_R	reference write current
R_a, R_z	measures of surface irregularity [see ISO 4287]
U_A	average signal amplitude
U_i	individual signal amplitude
U_R	reference signal amplitude
HiCo	high coercivity
LD	lower density
LoCo	low coercivity
SFD	switching field distribution
SQ	squareness
TFC	thin flexible card
UD	upper density

5 General characteristics

5.1 Introduction

Three card sizes, TFC.0, TFC.1 and TFC.5, are defined in EN 753.

Common physical characteristics and the geometrical and topographical characteristics of each card size are specified in EN 753-1:1997.

In this part of EN 753 the magnetic stripe and track characteristics specific to each size of card are given in separate clauses. Common characteristics are specified in clause 5. Specifications for the permitted magnetic and encoding characteristics are given in the annexes.

All clauses in all parts of EN 753 apply to finished cards or to the reels/packs from which such cards are taken. Certain clauses however, such as durability, 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 property can arise during subsequent processing.

5.2 Requirements common to all formats

5.2.1 General requirements

Thin flexible cards may be finished in a variety of ways, according to the requirements of the system in which they are to be used. This part of the standard deals with those which are equipped with a magnetic stripe.

Stripes may be magnetically encoded, in accordance with this part of EN 753.

The addition of a magnetic stripe and the encoding of that stripe shall not affect the continued conformance of the finished cards to the other applicable parts of EN 753.

Magnetic stripes, however presented, shall be free from defects which could interfere with usage, such as joins, discontinuities, loose particles, embedded debris, creases, indentations and high spots. They shall not adhere to, or leave an impression on, the adjacent cards in a reel or pack.

5.2.2 Reference edges

Once identified (in accordance with the criteria defined in clause 5 of EN 753-1:1997), the same front and reference edges shall be used exclusively and consistently in applying all relevant parts of EN 753, including this.

NOTE 1 : In the case of a central stripe, this constraint results in a unique relationship between reference edges and the beginning of the encoded message.

NOTE 2 : For example, in the case of a lateral stripe, this constraint results in the unique relationship between reference edges and stripe shown in figure 1.



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Figure 1 : Reference edges - Lateral stripe
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5.2.3 Presentation

When cards are presented in reel form, the back of the card bearing the magnetic stripe shall be on the internal face of the turns.

5.3 Environmental conditions

5.3.1 Testing environment

The environmental conditions under which the characteristics specified in this part of EN 753 are to be measured are specified in prEN 753-3.

5.3.2 Storage environment and packaging

Magnetic stripes shall continue to comply with the requirements of this standard after storage under the storage environment and packaging conditions specified in EN 753-1:1997.