
**Identification cards — Thin flexible cards —
Part 3:
Test methods**

Cartes d'identification — Cartes flexibles fines —

Partie 3: Méthodes d'essai

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/IEC 15457-3:2002](https://standards.iteh.ai/catalog/standards/sist/f51e6350-d515-4e52-8fab-f6872320f4f2/iso-iec-15457-3-2002)

<https://standards.iteh.ai/catalog/standards/sist/f51e6350-d515-4e52-8fab-f6872320f4f2/iso-iec-15457-3-2002>



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/IEC 15457-3:2002](https://standards.iteh.ai/catalog/standards/sist/f51e6350-d515-4e52-8fab-f6872320f4f2/iso-iec-15457-3-2002)

<https://standards.iteh.ai/catalog/standards/sist/f51e6350-d515-4e52-8fab-f6872320f4f2/iso-iec-15457-3-2002>

© ISO/IEC 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

| | Page |
|---|------|
| Foreword..... | vi |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 3 |
| 4 Test methods for physical characteristics | 4 |
| 4.1 General..... | 4 |
| 4.1.1 Reference | 4 |
| 4.1.2 Apparatus | 4 |
| 4.1.3 Sampling, preparation and storage of samples | 4 |
| 4.1.4 Conditioning and testing environment..... | 4 |
| 4.1.5 Test report | 5 |
| 4.2 Dimensions (except thickness)..... | 5 |
| 4.2.1 Reference | 5 |
| 4.2.2 Principle..... | 5 |
| 4.2.3 Procedure | 5 |
| 4.3 Thickness | 5 |
| 4.3.1 Reference | 5 |
| 4.3.2 Apparatus | 5 |
| 4.3.3 Procedure | 5 |
| 4.4 Separation force | 6 |
| 4.4.1 Reference | 6 |
| 4.4.2 Principle..... | 6 |
| 4.4.3 Apparatus | 6 |
| 4.4.4 Procedure | 6 |
| 4.4.5 Expression of result | 6 |
| 4.5 Reel winding..... | 7 |
| 4.5.1 Reference | 7 |
| 4.5.2 Apparatus | 7 |
| 4.5.3 Procedure | 7 |
| 4.6 Bursting strength..... | 8 |
| 4.6.1 Reference | 8 |
| 4.6.2 Procedure | 8 |
| 4.7 Stiffness..... | 8 |
| 4.7.1 Reference | 8 |
| 4.7.2 Procedure | 8 |
| 4.8 Folding endurance..... | 8 |
| 4.8.1 Reference | 8 |
| 4.8.2 Apparatus | 8 |
| 4.8.3 Procedure | 8 |
| 4.9 Ash content..... | 8 |
| 4.9.1 Reference | 8 |
| 4.9.2 Procedure | 8 |
| 4.10 Smoothness | 9 |
| 4.10.1 Reference | 9 |
| 4.10.2 Procedure | 9 |
| 4.11 Opacity (paper backing) and opacity (700-1 000 nm) | 9 |
| 4.11.1 Reference | 9 |
| 4.11.2 Procedure | 9 |
| 4.12 Coefficient of friction and destacking force | 9 |
| 4.12.1 Reference | 9 |

| | | |
|--------|---|----|
| 4.12.2 | Procedure | 9 |
| 4.13 | Reflectance factor | 10 |
| 4.13.1 | Reference | 10 |
| 4.13.2 | Procedure | 10 |
| 4.14 | Air permeance | 10 |
| 4.14.1 | Reference | 10 |
| 4.14.2 | Procedure | 10 |
| 4.15 | Sizing and pen-writing factor | 11 |
| 4.15.1 | Reference | 11 |
| 4.15.2 | Principle | 11 |
| 4.15.3 | Apparatus and reagents | 11 |
| 4.15.4 | Preparation of test pieces | 12 |
| 4.15.5 | Procedure | 12 |
| 4.15.6 | Expression of results | 13 |
| 4.16 | Tear resistance | 13 |
| 4.16.1 | Reference | 13 |
| 4.16.2 | Procedure | 13 |
| 4.17 | Delamination resistance | 13 |
| 4.17.1 | Reference | 13 |
| 4.17.2 | Principle | 14 |
| 4.17.3 | Apparatus | 14 |
| 4.17.4 | Preparation for test | 15 |
| 4.17.5 | Procedure | 15 |
| 4.17.6 | Expression of results | 16 |
| 4.17.7 | Test report | 16 |
| 4.18 | Cold-crack temperature (brittleness) | 18 |
| 4.18.1 | Reference | 18 |
| 4.18.2 | Procedure | 18 |
| 4.18.3 | Expression of results | 18 |
| 5 | Test methods for magnetic stripe physical characteristics | 19 |
| 5.1 | Preparation and storage of samples | 19 |
| 5.2 | Conditioning and test environments | 19 |
| 5.3 | Protrusion | 19 |
| 5.3.1 | Reference | 19 |
| 5.3.2 | Principle | 19 |
| 5.3.3 | Apparatus | 19 |
| 5.3.4 | Procedure | 20 |
| 5.4 | Profile deviation | 20 |
| 5.4.1 | Reference | 20 |
| 5.4.2 | Principle | 20 |
| 5.4.3 | Procedure | 20 |
| 5.5 | Roughness R_a and R_z | 21 |
| 5.5.1 | Reference | 21 |
| 5.5.2 | Principle | 21 |
| 5.5.3 | Procedure | 21 |
| 5.6 | Warpage | 21 |
| 5.6.1 | Reference | 21 |
| 5.6.2 | Procedure | 22 |
| 5.7 | Adherence | 22 |
| 5.7.1 | Reference | 22 |
| 5.7.2 | Apparatus | 22 |
| 5.7.3 | Procedure | 22 |
| 5.8 | Wear test | 22 |
| 5.8.1 | Reference | 22 |
| 5.8.2 | Principle | 22 |
| 5.8.3 | Procedure | 22 |
| 5.9 | Dimensional measurement of the magnetic stripe | 23 |
| 5.9.1 | Principle | 23 |
| 5.9.2 | Procedure | 23 |

ITC STANDARD PREVIEW
 (standards.itech.ai)

| | | |
|-------|---|----|
| 6 | Test methods for static magnetic characteristics..... | 23 |
| 6.1 | Principle..... | 23 |
| 6.2 | Apparatus..... | 23 |
| 6.3 | Preparation and storage of sample..... | 24 |
| 6.3.1 | Preparation..... | 24 |
| 6.3.2 | Storage..... | 24 |
| 6.3.3 | Conditioning and testing environment..... | 24 |
| 6.4 | Procedure..... | 24 |
| 6.4.1 | VSM..... | 24 |
| 6.4.2 | HM..... | 25 |
| 6.5 | Expression of results..... | 25 |
| 6.6 | Coercivity, H_{CM} | 26 |
| 6.6.1 | Reference..... | 26 |
| 6.6.2 | Procedure..... | 26 |
| 6.7 | Squareness, SQ | 27 |
| 6.7.1 | Reference..... | 27 |
| 6.7.2 | Procedure..... | 27 |
| 6.8 | Switching field distribution, (SF_D)..... | 27 |
| 6.8.1 | Reference..... | 27 |
| 6.8.2 | Procedure..... | 27 |
| 6.9 | Test report..... | 27 |
| 7 | Test method for dynamic magnetic characteristics..... | 28 |
| 7.1 | Principle..... | 28 |
| 7.2 | Reference cards..... | 28 |
| 7.3 | Apparatus..... | 28 |
| 7.3.1 | Measuring instrument for classes L and S..... | 28 |
| 7.3.2 | Measuring instrument for class H..... | 28 |
| 7.4 | Preparation and preservation of test samples..... | 28 |
| 7.4.1 | Preparation..... | 29 |
| 7.4.2 | Preservation..... | 29 |
| 7.4.3 | Conditioning and testing environment..... | 29 |
| 7.5 | Test procedure..... | 29 |
| 7.5.1 | Test densities (D_{max} and D_{min})..... | 29 |
| 7.6 | Expression of results..... | 29 |
| 7.6.1 | Resolution..... | 29 |
| 7.6.2 | Modulation..... | 30 |
| 7.7 | Test report..... | 30 |
| | Bibliography..... | 31 |

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 3.

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 part of ISO/IEC 15457 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 15457-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Identification cards and related devices*.

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 techniques*

— *Part 3: Test methods*

[ISO/IEC 15457-3:2002](https://standards.iteh.ai/catalog/standards/sist/51e6350-d515-4e52-8fab-f6872320f4f2/iso-iec-15457-3-2002)

<https://standards.iteh.ai/catalog/standards/sist/51e6350-d515-4e52-8fab-f6872320f4f2/iso-iec-15457-3-2002>

Identification cards — Thin flexible cards —

Part 3: Test methods

1 Scope

Thin flexible cards, the subject of this International 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.

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, etc.

This part of ISO/IEC 15457 specifies the test methods and procedures required to carry out measurements of the magnetic stripe and encoding characteristics of thin flexible cards.

Many of the standard methods available for checking physical properties of base materials are intended to be applied to samples cut from continuous material or large sheets. However, all test methods given herein, unless explicitly stated otherwise, apply to finished cards.

The test methods described are to be performed on separate samples. It is not intended that any individual card should pass through more than one test procedure, unless explicitly stated.

Acceptance criteria do not form part of this standard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 15457. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 15457 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 186, *Paper and board — Sampling to determine average quality*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 284, *Conveyor belts — Electrical conductivity — Specification and method of test*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets*

ISO 534, *Paper and board — Determination of thickness and apparent bulk density or apparent sheet density*

ISO 1831, *Printing specifications for optical character recognition*

ISO/IEC 15457-3:2002(E)

ISO 1924-2, *Paper and board — Determination of tensile properties — Part 2: Constant rate of elongation method*

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

ISO 2409, *Paints and varnishes — Cross-cut test*

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

ISO 2758, *Paper — Determination of bursting strength*

ISO 3274, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Nominal characteristics of contact (stylus) instruments*

ISO 4094, *Paper, board and pulps — International calibration of testing apparatus — Nomination and acceptance of standardizing and authorized laboratories*

ISO 4287-1, *Surface roughness — Terminology — Part 1: Surface and its parameters*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

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 5636-3, *Paper and board — Determination of air permeance (medium range) — Part 3: Bendtsen method*

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

ISO 8226-2, *Paper and board — Measurement of hygroexpansivity — Part 2: Hygroexpansivity up to a maximum relative humidity of 86 %*

ISO 8295, *Plastics — Film and sheeting — Determination of coefficients of friction*

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

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

ISO/IEC 10373-2, *Identification cards — Test methods — Part 2: Cards with magnetic stripes*

ISO/IEC 15457-1, *Identification cards — Thin flexible cards — Part 1: Physical characteristics*

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

IEC 60050-221, *International Electrotechnical Vocabulary — Chapter 221: Magnetic materials and components*

IEC 60454-2, *Specifications for pressure-sensitive adhesive tapes for electrical purposes — Part 2: Methods of test*

3 Terms and definitions

For the purposes of this part of ISO/IEC 15457, the terms and definitions given in ISO/IEC 15457-1, ISO/IEC 15457-2 and the following apply.

3.1

substrate

material of which the TFC is made without any recording media

3.2

composite

material made from at least two layers of different material, one of which is paper

3.3

reference signal amplitude

U_R

primary standard read back signal amplitude; the maximum value of the average signal amplitude of the reference card, corrected to the primary standard

3.4

reference write current

I_R

primary standard write current, obtained from the secondary reference card by measurement

3.5

reference flux

F_R

flux in the test write head when the write current is I_R

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.6

test piece

part of the sample or test sample on which the test is conducted

<https://standards.iteh.ai/catalog/standards/sist/51e6350-d515-4e52-8fab-16872320f412/iso-iec-15457-3-2002>

3.7

uncertainty of measurement

an estimate characterising the range of values within which the true value of a measurand lies

[International vocabulary of basic and general terms in metrology]

3.8

⟨optical⟩ transmittance factor

T

ratio of the measured ⟨optical⟩ flux transmitted by a specimen to the measured flux when the specimen is removed from the sampling aperture of the measuring device:

$$T = \Phi_t / \Phi_j$$

where

T is the transmittance factor;

Φ_t is the transmitted ⟨optical⟩ flux;

Φ_j is the aperture flux.

[ISO 5-2:1991]

3.9

opacity
(optical) transmission density

D_T
logarithm to the base 10 of the reciprocal of the transmittance factor:

$$D_T = \log_{10} 1/T = \log_{10} \Phi_j / \Phi_\tau$$

[ISO 5-2:1991]

4 Test methods for physical characteristics

4.1 General

4.1.1 Reference

ISO/IEC 15457-1, Physical characteristics.

4.1.2 Apparatus

In order to obtain consistent and reproducible results, the apparatus and test devices used to carry out the tests shall comply with ISO 4094, wherever applicable.

4.1.3 Sampling, preparation and storage of samples

STANDARD PREVIEW
(standards.iteh.ai)

4.1.3.1 Sampling

The sampling shall be in accordance with Table 1. [ISO/IEC 15457-3:2002
https://standards.iteh.ai/catalog/standards/sist/51e6350-d515-4e52-8fab-6587237081d2/iso-iec-15457-3-2002](https://standards.iteh.ai/catalog/standards/sist/51e6350-d515-4e52-8fab-6587237081d2/iso-iec-15457-3-2002)

In certain cases samples may be taken from the base material before card manufacture if it can be demonstrated that no significant change in the property to be tested can arise during subsequent processing.

The samples used to prepare a set of test pieces shall be taken from the same batch of TFC base material.

4.1.3.2 Preparation

Test samples shall wherever possible be either finished cards or prepared from finished cards. They shall be conditioned in accordance with 4.1.4.

Test pieces shall, as necessary, be prepared from the test samples in the particular form required by the test apparatus used.

4.1.3.3 Storage

Any test samples or test pieces retained for reference shall be stored under the environmental conditions specified in 5.3.2 of ISO/IEC 15457-1 in such a manner that degradation due to moisture, light, physical distortion, plasticisers and other contamination shall not occur.

All such samples shall be clearly cross-referenced to the test report and any relevant supplementary documentation.

4.1.4 Conditioning and testing environment

Unless otherwise specified, the conditioning of test samples, and environment for the tests specified in this standard shall be in accordance with Table 1.

Table 1 — Sampling, conditioning and test environment parameters

| Card material | Sampling | Conditioning and testing environment standard | Conditioning and testing environment atmosphere ^a |
|---------------|----------|---|--|
| Paper | ISO 186 | ISO 187 | 23 °C/50 °C ordinary tolerances |
| Composite | ISO 186 | ISO 187 | 23 °C/50 °C ordinary tolerances |
| Plastic | ISO 186 | ISO 291 | normal atmosphere 23 °C/50 °C |

^a "Ordinary tolerances" and "normal atmosphere" are explicit terms taken from the referenced standards.

4.1.5 Test report

The test report shall be accurate, clear and ensure full traceability.

4.2 Dimensions (except thickness)

4.2.1 Reference

ISO/IEC 15457-1, Geometry.

ISO/IEC 15457-1, Positioning features.

4.2.2 Principle

The principle is direct linear measurement. The dimensions shall be measured with an accuracy appropriate to the tolerance of the prescribed value of the characteristics of ISO/IEC 15457-1.

4.2.3 Procedure

<https://standards.iteh.ai/catalog/standards/sist/51e6350-d515-4e52-8fab-f6872320f4f2/iso-iec-15457-3-2002>

Measure TFC dimensions using a method and apparatus that ensures a total measurement uncertainty equal to or less than 25 % of the absolute value of the tolerance of the dimension to be checked.

EXAMPLE Value = d mm \pm 0,2 mm; total uncertainty \leq 0,05 mm.

During the performance of the measurement, ensure that any mechanical force applied to the edge of the card during measurement does not exceed 6 N per 10 mm length.

NOTE An optical method may be used.

4.3 Thickness

4.3.1 Reference

ISO/IEC 15457-1, Annex A or B.

4.3.2 Apparatus

Dead weight micrometer.

4.3.3 Procedure

Determine the thickness of paper or composite TFCs in accordance with ISO 534, using a pressure of 100 kPa, outside the data recording area. Thickness shall be the average measurement of three different measurements taken on the same card in three different locations.

4.4 Separation force

4.4.1 Reference

ISO/IEC 15457-1, Separation force.

ISO/IEC 15457-1, Perforations.

4.4.2 Principle

To measure, in the direction of the width of the samples, the force needed to break the bridges of the perforated line between two parts of a card or between two cards.

4.4.3 Apparatus

A tensile tester, including a dynamometer able to apply a force of at least 500 N with a speed of 100 mm/min. Figure 1 shows the arrangement of the test piece in the apparatus.

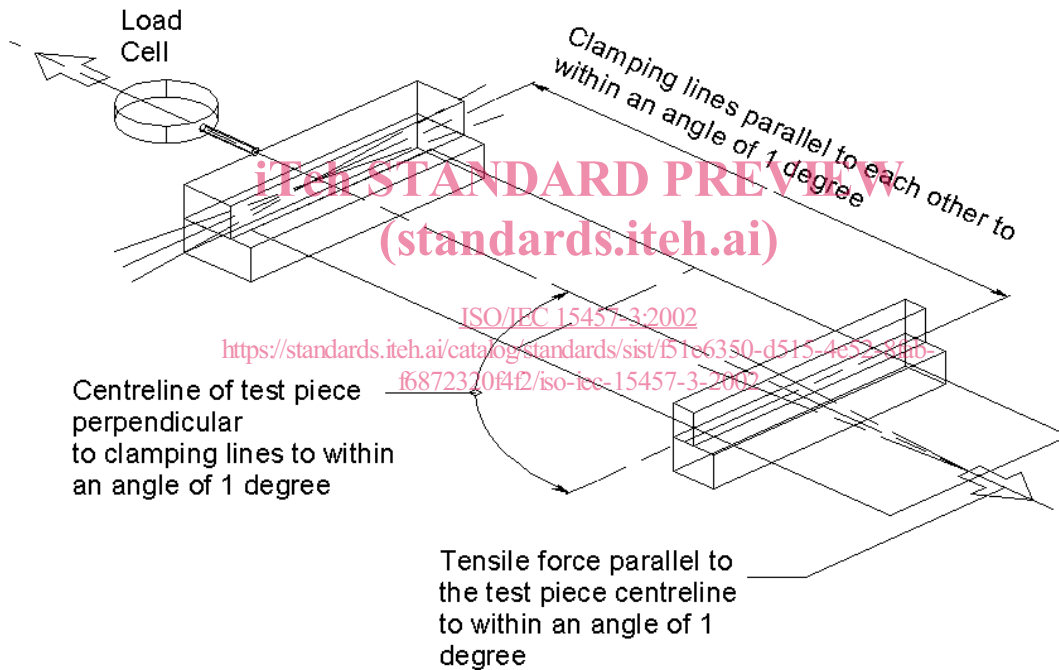


Figure 1 — Test arrangement for separation force

4.4.4 Procedure

Take sufficient samples to prepare ten test pieces which include the perforation line to be tested and prepare the test pieces such that the test is carried out on the full height of the card.

Carefully open out any test pieces which are folded. Keep five test pieces unfolded and fold all the other test pieces 5 times through an angle of 180° (i.e. from the fully open state to the fully closed state).

Measure the separation force for each test piece at a speed of 100 mm/min.

4.4.5 Expression of result

For each test, before or after folding, express the result as the average value of the individual values.