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Information technology — Test methods for machine readable travel documents (MRTD) and associated devices —

Part 2: Test methods for the contactless interface

Technologies de l'information — Méthodes d'essai pour les documents de voyage lisibles par machine (MRTD) et dispositifs associés —

Partie 2: Méthodes d'essai de l'interface sans contact

Reference number
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Foreword

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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*, SC 17, *Cards and personal identification*.

ISO/IEC 18745 consists of the following parts, under the general title, *Test methods for machine readable travel documents (MRTD) and associated devices*:

— *Part 1: Physical test methods for passport books (durability)*

— *Part 2: Test methods for the contactless interface*

Introduction

This part of ISO/IEC 18745 defines the test plan regarding contactless interface for eMRTDs and eMRTD associated readers compliant to ICAO Doc 9303.

Information technology — Test methods for machine readable travel documents (MRTD) and associated devices —

Part 2: Test methods for the contactless interface

1 Scope

This part of ISO/IEC 18745 defines the test plan, based on ISO/IEC 10373-6, for the contactless interface of eMRTDs and eMRTD associated readers compliant with ICAO Doc 9303.

Application requirements for eMRTD and eMRTD reader are outside of the scope of this part of ISO/IEC 18745.

2 Normative references

The following referenced documents are indispensable for the application 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 7810:2003/Amd 1:2009, *Identification cards — Physical characteristics*

ISO/IEC 10373-6:2016, *Identification cards — Test methods — Part 6: Proximity cards*[1)]

ISO/IEC 14443-1:2016, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 1: Physical characteristics*[1)]

ISO/IEC 14443-2:2016, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 2: Radio frequency power and signal interface*[1)]

ISO/IEC 14443-3, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 3: Initialization and anticollision*[1)]

ISO/IEC 14443-4:2016, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 4: Transmission protocol*[1)]

ICAO Doc 9303, *Machine Readable Travel Documents — Seventh Edition, 2015*

3 Terms and definition

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

3.1
test method
method for testing the characteristics of eMRTDs and eMRTD associated readers for the purpose of assessing their conformance with International Standards

1) If ISO/IEC 10373 or ISO/IEC 14443 series are referred, read with replacing PICC with eMRTD and PCD with eMRTD associated reader.

3.2
sample
one piece of the total number of eMRTDs or eMRTD associated readers required and presented for testing according to this specification

3.3
room temperature
convenient temperature within the range of 23 °C ± 3 °C (73 °F ± 5 °F)

4 Symbols and abbreviated terms

For the purposes of this document, the following abbreviations apply.

AA active authentication

BAC basic access control

CVCA country verifying certification authority

DV document verifier

EAC extended access control (throughout this part of ISO/IEC 18745, the term EAC refers to EAC v1)

IS inspection system

LDS logical data structure

PACE password authenticated connection establishment (throughout this part of ISO/IEC 18745, the term PACE refers to PACE v2)

DUT device under test

H_{min} minimum field strength as defined in ISO/IEC 14443-2

H_{max} maximum field strength as defined in ISO/IEC 14443-2

eMRTD electronic machine readable travel document

“XY” hexadecimal notation, equal to XY in base 16

5 Test methods for eMRTD

5.1 General test conditions

The test methods defined in Clause 5 are in line with the test methods defined in ISO/IEC 10373-6:2001/Amd 7:2010, but updated in accordance with ISO/IEC 10373-6:2016.

Test conditions and procedures in this Clause are based on ISO/IEC 10373-6 taking into account specific needs of eMRTD application.

Clause 7 addresses only requirements introduced by amendments on ISO/IEC 10373-6:2011 published after 2011 and integrated in the third edition of ISO/IEC 10373-6:

— ISO/IEC 10373-6:2011/Amd.1:2012;

— ISO/IEC 10373-6:2011/Amd.2:2012;

— ISO/IEC 10373-6:2011/Amd.3:2012;

— ISO/IEC 10373-6:2011/Amd.4:2012;

— ISO/IEC 10373-6:2011/Amd.5:2015;[2)]

— ISO/IEC 10373-6:2011/Amd.6:2015;[2)]

— ISO/IEC 10373-6:2011/Amd.7:2015.[2)]

The following subclauses specify the different test setups, the values used for the tests, and a recommendation for the format of the test report.

Depending on the implementation statement of the applicant, Type A or Type B tests shall be performed.

For tests of ISO/IEC 14443-1 and ISO/IEC 14443-2 parameters, the minimum number of samples provided for testing is three, unless explicitly defined otherwise. The applicant may request that a larger number of samples are tested. The samples provided by the applicant should be personalized and marked each with a unique serial number. Serial numbers shall be reported in the test report.

It is not mandatory to use the same samples to run all the tests defined in this standard. For example, an applicant can provide:

— 3 samples for static electricity test;

— 3 samples for alternating magnetic field test;

— 3 samples for ISO/IEC 14443-2 parameters;

— 1 sample for ISO/IEC 14443-3 and ISO/IEC 14443-4 parameters.

For tests where mandatory field strength values are specified, a transition period for eMRTD requiring higher field strength may apply.

5.1.1 Test setup

The Test PCD assembly that is defined in ISO/IEC 10373-6 is the basis for the physical and electrical tests. The matching network defined in ISO/IEC 10373-6:2016, A.2.2 is used together with the Test PCD assembly.

The Test PCD assembly shall be adapted to carry an eMRTD with the additional ability to center an ID-1 sized antenna of an eMRTD in the Test PCD assembly.

Some of the following tests are assuming an antenna size within ID-1 outline. If antenna is greater than ID-1 size, those tests might not generate accurate results.

5.1.2 Values unless otherwise specified

The values defined in Table 1 are typical values for communication parameters.

Unless otherwise specified, the following environmental parameters and values defined in Table 1 shall be used.

Table 1 — Values unless otherwise specified

Parameter	Value	To be applied to
Parameters applicable for all bit rates		
Environment temperature	room temperature	Type A and Type B
Relative humidity	25 % to 75 %[a]	Type A and Type B
[a] Any convenient relative humidity within the specified range.		

2) Not published but integrated in the third revision of ISO/IEC 10373-6.

Table 1 *(continued)*

Parameter	**Value**	**To be applied to**
Start Of Frame timing (SOF)	10 etu “0” followed by 2 etu “1”	Type B
End Of Frame timing (EOF)	10 etu “0”	Type B
Extra Guard Time (EGT)	0 etu	Type B
Maximum Frame Size Code in ATTRIB	8	Type B
FSDI	8	Type A
Parameters applicable for eMRTD reader to eMRTD bit rate *fc*/128		
Modulation	100 %	Type A
t_1	40/*fc*	Type A
t_2	7/*fc*	Type A
t_3	12/*fc*	Type A
t_4	6/*fc*	Type A
Overshoot	0 %	Type A and Type B
Modulation index *m*	12 %	Type B
Rise time, t_r, fall time, t_f	12/*fc*	Type B
Parameters applicable for eMRTD reader to eMRTD bit rate *fc*/64		
a	0,1	Type A
t_1	18/*fc*	Type A
t_5	15/*fc*	Type A
t_6	9/*fc*	Type A
Overshoot	0 %	Type A and Type B
Modulation index *m*	12 %	Type B
Rise time t_r, fall time t_f	10/*fc*	Type B
Parameters applicable for eMRTD reader to eMRTD bit rate *fc*/32		
a	0,2	Type A
t_1	9/*fc*	Type A
t_5	7/*fc*	Type A
t_6	8/*fc*	Type A
Overshoot	0 %	Type A and Type B
Modulation index *m*	12 %	Type B
Rise time t_r, fall time t_f	8/*fc*	Type B
Parameters applicable for eMRTD reader to eMRTD bit rate *fc*/16		
a	0,4	Type A
t_1	5/*fc*	Type A
t_5	4/*fc*	Type A
t_6	5/*fc*	Type A
Overshoot	0 %	Type A and Type B
Modulation index *m*	12 %	Type B
Rise time t_r, fall time t_f	6/*fc*	Type B
[a] Any convenient relative humidity within the specified range.		

5.1.3 Test report

The test report shall include the number of successful evaluations versus the total number of evaluations for each sample and for each test. A description of each test, the information whether the result was a pass or a fail, and the date of the tests shall be included.

For all functionality check tests, the report shall state what tools and methods have been used to verify the functionality of the eMRTD.

5.1.4 Applicant declaration

In order to set up the tests properly, the applicant shall provide the information specified in Table 2.

Table 2 — Applicant information on eMRTD product

Product characteristic	Standard reference	Applicant declaration
Physical Size of Product[a]	ICAO Doc 9303-2	ID-1: YES/NO
Location of antenna within eMRTD	ICAO Doc 9303-9	
Claimed PICC class[b]	ISO/IEC 14443-1 ISO/IEC 14443-2	PICC Class 1 or 2 or 3 or 4 or 5 or 6
(Optional) shielding of eMRTD	Application Profile for Contact-less Interface Doc9303 v1.3	YES/NO If yes, precise where shielding is applied
(Optional) eMRTD resonance frequency range	Application Profile for Contact-less Interface Doc9303 v1.3	Minimum and maximum resonance frequency in MHz
Type	ISO/IEC 14443-2 ISO/IEC 14443-3 ISO/IEC 14443-4	Type A/Type B
Random or fixed UID (Type A) or PUPI (Type B)	ISO/IEC 14443-3	Indicate if the UID (Type A) or PUPI (Type B) is random or fixed
(Optional) eMRTD reader to eMRTD supported bit rates	ISO/IEC 14443-2 ISO/IEC 14443-3 ISO/IEC 14443-4	List of supported optional eMRTD reader to eMRTD bit rates
(Optional) eMRTD to eMRTD reader supported bit rates	ISO/IEC 14443-2 ISO/IEC 14443-3 ISO/IEC 14443-4	List of supported optional eMRTD to eMRTD reader bit rates
(Optional) support of exchange of additional parameters	ISO/IEC 14443-4	YES/NO
Maximum frame size supported	ISO/IEC 14443-3 ISO/IEC 14443-4	Declare the maximum frame size integer in reception supported by the eMRTD
(Optional) Frames with error corrections supported	ISO/IEC 14443-4	YES/NO
(Optional) support of NAD and CID	ISO/IEC 14443-4	NAD: YES/NO CID: YES/NO
Command requesting S(WTX)	ISO/IEC 14443-4	Provide a command needing more than FWT time for execution. If the eMRTD does not support any command needing more than FWT time for execution, the scenarios using this command are not applicable.

[a] If eMRTD size is ID-2 or ID-3, select NO.

[b] If no PICC Class is claimed, PICC Class 1 is used in the test methods.

[c] Information required to perform authentication will be provided by the applicant (Machine Readable Zone (MRZ)/ Card Access Number (CAN), EAC certificates chain with IS private key, static/dynamic binding). If no access control is selected by the applicant, eMRTD supports plaintext access.

[d] Information required to perform Active Authentication will be provided by the applicant (Extended Length).

Table 2 *(continued)*

Product characteristic	Standard reference	Applicant declaration
Access control applied[c]	ICAO Doc 9303-11	BAC: YES/NO EAC: YES/NO PACE: YES/NO
Active Authentication[d]	ICAO Doc 9303-11	YES/NO
(Optional) Extended Length APDU supported	ISO/IEC 7816-4	YES/NO
(Optional) EMD	ISO/IEC 14443-2	

[a] If eMRTD size is ID-2 or ID-3, select NO.

[b] If no PICC Class is claimed, PICC Class 1 is used in the test methods.

[c] Information required to perform authentication will be provided by the applicant (Machine Readable Zone (MRZ)/ Card Access Number (CAN), EAC certificates chain with IS private key, static/dynamic binding). If no access control is selected by the applicant, eMRTD supports plaintext access.

[d] Information required to perform Active Authentication will be provided by the applicant (Extended Length).

5.2 Test of ISO/IEC 14443-1 parameters

5.2.1 “Class 1” verification test (optional)

5.2.1.1 Purpose

The purpose of this test is to check if the physical coil dimensions meet the requirements according to ISO/IEC 14443-1.

This test is optional and shall be applied if the applicant claims compliance with “Class 1” in Table 2.

5.2.1.2 Test procedure

Determine whether the eMRTD antenna is within the PICC antenna zone as described in ISO/IEC 14443-1:2016, A.1.1. The applied method (for example, X-ray) is under responsibility of test laboratory.

5.2.1.3 Test report

The test report shall state whether the coil geometry of the antenna is in accordance with “Class 1” definition.

5.2.2 Static electricity test

5.2.2.1 Purpose

See ISO/IEC 10373-6:2016, 6.2.2.

5.2.2.2 Test procedure

Apply ISO/IEC 10373-6:2016, 6.2.2. The discharge value is selected according to ISO/IEC 7810:2003/Amd 1, 9.4.2.

In case the physical size of the eMRTD is different from ID-1, the test procedure shall be applied at the centers of a two dimensional 1 cm × 1 cm mesh placed over the DUT.

5.2.2.3 Test report

The test report shall state whether or not the eMRTDs operate as described in 5.6 after the applied test procedure.

5.2.3 Alternating magnetic field test

5.2.3.1 Purpose

See ISO/IEC 10373-6:2016, 6.2.1.

5.2.3.2 Test procedure

Apply ISO/IEC 10373-6:2016, 6.2.1.

5.2.3.3 Test report

The test report shall state whether or not the eMRTDs operate as described in 5.6 after the applied test procedure.

5.3 Test of ISO/IEC 14443-2 parameters

5.3.1 eMRTD transmission

5.3.1.1 Purpose

See ISO/IEC 10373-6:2016, 7.2.1.1.

5.3.1.2 Test procedure

Apply ISO/IEC 10373-6:2016, 7.2.1 under the following conditions:

At temperatures −10 °C and room temperature:

— mandatory: 1,5 A/m(rms), 2,5 A/m(rms), 3,5 A/m(rms), 4,5 A/m(rms), 7,5 A/m(rms);

— optional: 5,5 A/m(rms), 6,5 A/m(rms).

At temperature 50 °C:

— mandatory: 1,5 A/m(rms), 2,5 A/m(rms), 3,5 A/m(rms), 4,5 A/m(rms), 6,0 A/m(rms);

— optional: 5,5 A/m(rms).

NOTE Optional and mandatory field strength values are chosen in line with the following reasons:

— most of eMRTD associated readers operate between 1,5 A/m(rms) and 4,5 A/m(rms);

— check that there is no potential communication hole between 1,5 A/m(rms) and 4,5 A/m(rms) or more.

5.3.1.3 Test report

The test report shall give the load modulation amplitudes of the upper and lower sidebands at *fc* + *fs* and *fc* - *fs* and the applied fields strengths and modulations.