



SLOVENSKI STANDARD SIST-TS CEN/TS 16794-2:2019

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Javni prevoz - Komunikacija med brezkontaktnimi čitalniki/terminali in prevoznimi mediji - 2. del: Načrt za preskus po ISO/IEC 14443

Public transport - Communication between contactless readers and fare media - Part 2: Test plan for ISO/IEC 14443

Öffentlicher Verkehr - Kommunikation zwischen berührungslosen Lesegeräten und Fahrscheinmedien - Teil 2: Prüfplan zur ISO/IEC 14443

Transport Public - Communication entre terminaux et objets sans contact - Partie 2 : Plan de test pour l'ISO/IEC 14443

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Ta slovenski standard je istoveten z: CEN/TS 16794-2:2019

ICS:

35.240.15	Identifikacijske kartice. Čipne kartice. Biometrija	Identification cards. Chip cards. Biometrics
35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport

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Supersedes CEN/TS 16794-2:2017

English Version

Public transport - Communication between contactless readers and fare media - Part 2: Test plan for ISO/IEC 14443

Transport Public - Communication entre terminaux et objets sans contact - Partie 2 : Plan de test pour l'ISO/IEC 14443

Öffentlicher Verkehr - Kommunikation zwischen berührungslosen Lesegeräten und Fahrscheinmedien - Teil 2: Prüfplan zur ISO/IEC 14443

This Technical Specification (CEN/TS) was approved by CEN on 17 June 2019 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (CEN/TS 16794-2:2019) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 16794-2:2017.

This edition updates the test plan to verify the requirements expressed within CEN/TS 16794-1:2019 and relies on the test methods described in ISO/IEC 10373-6:—.

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CEN/TS 16794-2:2019 (E)

1 Scope

This document comes as a complement to the technical requirements expressed in CEN/TS 16794-1, for ensuring contactless communication interoperability between Public Transport (PT) devices or between PT devices compliant to CEN/TS 16794-1 and NFC mobiles devices compliant to NFC Forum specifications.

This document lists all the test conditions to be performed on a PT reader or a PT object in order to ensure that all the requirements specified in CEN/TS 16794-1 are met for the PT device under test.

This document applies to PT devices only:

- PT readers which are contactless fare management system terminals acting as a PCD contactless reader based on the ISO/IEC 14443 series;
- PT objects which are contactless fare media acting as a PICC contactless object based on the ISO/IEC 14443 series.

This document applies solely to the contactless communication layers described in Parts 1 to 4 of the ISO/IEC 14443 series. Application-to-application exchanges executed once contactless communication has been established at RF level fall outside the scope of this document. However, a test application will be used so as to make end-to-end transactions during tests on the RF communication layer.

This document does not duplicate the contents of the ISO/IEC 14443 series or ISO/IEC 10373-6 standard. It makes reference to the ISO/IEC 10373-6 applicable test methods, specifies the test conditions to be used and describes the additional specific test conditions that may be run.

The list of test conditions applicable to the PT device under test will be conditioned by the Information Conformance Statement (ICS) declaration made by the device manufacturer. For each test case, the test conditions are clearly specified in order to determine the pertinence to run or not the test case in accordance with the device capabilities or in accordance with the device manufacturer's choice.

In order to facilitate the test report issuance, a test report template is included in Annex A of this document.

Although this document aims at becoming the primary basis for certification of contactless communication protocol applicable to PT readers and PT objects, it does not describe any certification or qualification processes as such processes should be defined between local or global transit industry stakeholders.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

CEN/TS 16794-1, *Public transport — Communication between contactless readers and fare media — Part 1: Implementation requirements for ISO/IEC 14443*

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

ISO/IEC 14443-1:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 1: Physical characteristics*

¹ Under preparation. Stage at the time of publication: ISO/IEC DIS 10373-6:2017.

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

ISO/IEC 14443-3:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 3: Initialization and anticollision*

ISO/IEC 14443-4:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 4: Transmission protocol*

ISO/IEC 15693-2, *Cards and security devices for personal identification — Contactless vicinity objects — Part 2: Air interface and initialization*

ISO/IEC 18092, *Information technology — Telecommunications and information exchange between systems — Near Field Communication — Interface and Protocol (NFCIP-1)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

PT device

PT reader or PT object

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3.2

PT object

ISO/IEC 14443 PICC specifically designed for the use in PT systems

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3.3

PT reader

ISO/IEC 14443 PCD specifically designed for the use in PT systems

3.4

Reference PICC

Reference PICC card as defined in test method ISO/IEC 10373-6

4 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms given in CEN/TS 16794-1, ISO/IEC 14443 (all parts), ISO/IEC 10373-6 and the following apply.

t_{detect} Maximum Reference PICC time-to-detection

² Under preparation. Stage at the time of publication: ISO/IEC DIS 14443-2:2017.

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5 Description of the test environment

5.1 Test bench

The test bench shall conform to the specifications set out in ISO/IEC 10373-6:—, Clause 5.

5.2 Tolerances applicable to ambient-environment tests

The ambient temperature and relative humidity shall conform to the specifications set out in ISO/IEC 10373-6:—, 4.1. The tolerance for minimum and maximum temperatures is ± 3 °C.

5.3 Test conditions for PCD

Unless otherwise specified, the test conditions defined below shall be applied.

— For IFM readers:

Conditions	Values
Test positions and Reference PICCs	Range A: Every position of range A (Position A1 to Position A7) with Reference PICCs 1, 2 and 3 Range B: Every position of range B (Position B1 to Position B3) with Reference PICC 3

— For Common readers:

Conditions	Values
Test positions and Reference PICCs	Range A: Position A1, Position A1,1, Position A1,2, Position A1,3, Position A1,4 and Position A2 of range A with Reference PICCs 1, 2 and 3 Range B: no position

IFM readers, Common readers and test positions are defined in CEN/TS 16794-1.

Unless otherwise specified, the values defined in ISO/IEC 10373-6:—, Table 4 shall be used to adjust PCD-test-apparatus parameters.

5.4 Test conditions for PICC

Unless otherwise specified, the test conditions defined below shall be applied.

Conditions	Values
Field strength	For PICC Class 1: 1,5 A/m, 2 A/m, 2,5 A/m, 3,5 A/m, 4,5 A/m, 6 A/m and 7,5 A/m For PICC Class 2 and Class 3: 1,5 A/m, 2 A/m, 2,5 A/m, 3,5 A/m, 4,5 A/m, 6 A/m and 8,5 A/m

Unless otherwise specified, the values defined in ISO/IEC 10373-6:—, Table 7 shall be used to adjust PICC-test-apparatus parameters.

5.5 Positional tolerance

Parameter	Unit	Tolerance
PICC-to-PCD distance	Millimetres (mm)	± 1 mm, except at 0

5.6 Admissible tolerances on the measurements

Tolerances specified in ISO/IEC 10373-6 shall be applied.

6 PCD – Test plan

6.1 PCD conformance to ISO/IEC 14443 series

Apply ISO/IEC 10373-6:—, 0.1 with the following:

- Alternating magnetic field test (ISO/IEC 10373-6:—, Table 0.8) shall be performed with Reference PICC 1 only (in any possible PICC position).
- The procedure for H_{\min} test of PCD field strength test (ISO/IEC 10373-6:—, Table 0.9) shall be performed with a V_{load} voltage of 6 V for Reference PICC 1 until 2020 and the two results for Reference PICC 1 (with a V_{load} voltage of 4,5 V and with a V_{load} voltage of 6 V) shall be given in the test result.

In addition, the minimum field strength specified in CEN/TS 16794-1 for range B shall be used instead of H_{\min} for tests performed within range B.

- Modulation index and waveform test (ISO/IEC 10373-6:—, Table 0.9) shall be performed with Reference PICCs 1 and 2 in Position A1, Reference PICC 3 in Position B1 for IFM readers and Position A1 for Common readers and the calibration coil at an arbitrary position.
- Load modulation reception test (ISO/IEC 10373-6:—, Table 0.9) shall be performed with Reference PICC 1 in Position A2 and Reference PICC 3 in Position B2 for IFM readers and Position A2 for Common readers at minimum and maximum temperatures. At ambient temperature, see 5.3.
- PCD EMD immunity test (ISO/IEC 10373-6:—, Table 0.9) shall be performed with Reference PICC 1 in Position A1 and Position A2.
- Position A1 shall be used for tests defined in ISO/IEC 10373-6:—, Table 0.11 and Table 0.12.

NOTE More modifications may apply as defined in 6.3.

6.2 PCD conformance to CEN/TS 16794-1

6.2.1 TC_PCD_D_TADT: PCD Type A detection time

6.2.1.1 Scope / purpose

This test verifies that the PCD detects and selects a Type A Reference PICC entering the field and indicating no SFGT needed, in less than t_{detect} , regardless of the moment when the Reference PICC is placed within range A or B of the contactless reader.

6.2.1.2 Test procedure

Perform the test procedure defined in ISO/IEC 10373-6:—, H.2.7.3 with the following:

- step b), the LT is disabled until the start of timing measurement, a point of time randomly chosen, independently from the PCD polling cycle;

NOTE If the PCD's field is not continuously active, the start of timing measurement is the moment when the field is started.

- step e), the end of timing measurement corresponds to the beginning of the SOF of the first I-block sent by the PCD;

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- this test procedure is repeated at least 10 times to get the average value for the Reference PICC time-to-detection.

6.2.1.3 Test report

The test report shall give the average value for the Type A Reference PICC time-to-detection.

Fill the TC_PCD_D_TADT row of test plan summary in accordance with Table 1.

Table 1 — Result criteria for PCD Type A detection time test

Explanation	Test result
Only when the average duration between the moment when the Type A Reference PICC is enabled and the beginning of the first I-block sent by the PCD is less than t_{detect}	PASS
Any other case	FAIL

6.2.2 TC_PCD_D_TBDT: PCD Type B detection time**6.2.2.1 Scope / purpose**

This test verifies that the PCD detects and selects a Type B Reference PICC entering the field and indicating no SFGT needed, in less than t_{detect} , regardless of the moment when the Reference PICC is placed within range A or B of the contactless reader.

6.2.2.2 Test procedure

Perform the test procedure defined in ISO/IEC 10373-6:—, H.3.2.3 with the following:

- step b), the LT is disabled until the start of timing measurement, a point of time randomly chosen, independently from the PCD polling cycle, when enabled, the LT will answer to the first valid REQB/WUPB command frame using an AFI of 00h;

NOTE If the PCD's field is not continuously active, the start of timing measurement is the moment when the field is started.

- step c), the LT answers with an ATQB not including the optional Extended ATQB byte (optional 4th byte of protocol info field) whatever the Extended ATQB support indicated by the PCD in its REQB/WUPB command frame;
- step h), the end of timing measurement corresponds to the beginning of the SOF of the first I-block sent by the PCD;
- this test procedure is repeated at least 10 times to get the average value for the Reference PICC time-to-detection.

6.2.2.3 Test report

The test report shall give the average value for the Type B Reference PICC time-to-detection.

Fill the TC_PCD_D_TBDT row of test plan summary in accordance with Table 2.

Table 2 — Result criteria for PCD Type B detection time test

Explanation	Test result
Only when the average duration between the moment when the Type B Reference PICC is enabled and the beginning of the first I-block sent by the PCD is less than t_{detect}	PASS
Any other case	FAIL

6.2.3 TC_PCD_D_AFI: AFI value sent by the PCD

6.2.3.1 Scope / purpose

This test verifies that the PCD uses an AFI of 00h when polling for Type B PICCs.

6.2.3.2 Test procedure

Perform the test procedure defined in 6.2.2.2 to verify that the PCD uses an AFI of 00h in at least some REQB/WUPB command frames.

6.2.3.3 Test report

The test report shall state whether the PCD was using an AFI of 00h in at least some REQB/WUPB command frames.

Fill the TC_PCD_D_AFI row of test plan summary in accordance with Table 3.

Table 3 — Result criteria for AFI value sent by the PCD test

Explanation	Test result
Only when the PCD uses an AFI of 00h in at least one REQB/WUPB command frame in its polling sequence	PASS
Any other case	FAIL

6.2.4 TC_PCD_D_RFU: Recommendations on RFU bits and values reception test

6.2.4.1 Scope / purpose

This test verifies that the PCD complies with the requirements defined in the ISO/IEC 14443 series on reception of bits and values reserved for future use.

These requirements in ISO/IEC 14443-3:2018 are the following:

- 5.3: A PICC or PCD receiving RFU bits shall ignore the value of these bits and shall maintain and not change its function, unless explicitly stated otherwise.
- 6.5.2.1 (ATQA): A PCD detecting a collision in any bit of (b16 to b1) shall commence with the first step of the anticollision loop (see 6.5.3.1). The PCD shall commence with the first step of the anticollision loop regardless of any value in the proprietary field b12 to b9.
- 7.9.4.3 (FWI, Type B): Until the RFU value 15 is assigned, a PCD receiving FWI = 15 shall interpret it as FWI = 4.
- 7.9.4.5 (Max_Frame_Size, Type B): Until the RFU values 'D' - 'F' are assigned, a PCD receiving Maximum Frame Size Code = 'D' - 'F' shall interpret it as Maximum Frame Size Code = 'C' (maximum frame size 4096 bytes).

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- 7.9.4.6 (Bit_Rate_capability, Type B): Until the RFU values with b4 = (1)b are assigned, a PCD receiving Bit_Rate_capability with b4 = (1)b shall interpret the Bit_Rate_capability byte as if (b8 to b1) = (00000000)b (only fc/128 in both directions).
- 7.9.4.7 (SFGI, Type B): Until the RFU value 15 is assigned, a PCD receiving SFGI = 15 shall interpret it as SFGI = 0.

These requirements in ISO/IEC 14443-4:2018 are the following:

- 5.2.3 (FSCI, Type A): Until the RFU values 'D'-'F' are assigned, a PCD receiving an FSCI = 'D'-'F' shall interpret it as FSCI = 'C' (FSC = 4096 bytes).
- 5.3.5 (SFGI, Type A): Until the RFU value 15 is assigned, a PCD receiving SFGI = 15 shall interpret it as SFGI = 0.
- 5.3.5 (FWI, Type A): Until the RFU value 15 is assigned, a PCD receiving FWI = 15 shall interpret it as FWI = 4.
- 7.2.2.2 (CID, Type A and Type B): A PICC or PCD receiving (b6,b5) = (01)b or (10)b or (11)b shall treat it as a protocol error.
- 7.4 (WTXM, Type A and Type B): When receiving WTXM = 0 or WTXM = 60-63 the PCD shall treat it as a protocol error.

6.2.4.2 Test procedures

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Perform the 3 test procedures defined in ISO/IEC 10373-6:—, H.2.4.3.1, H.2.4.3.2 and H.2.4.3.3, with the following:

- step c), the LT answers with ATQA = 'FFFF'.

After the protocol activation procedure in accordance with ISO/IEC 10373-6:—, H.1.8.2 for Type A or H.1.8.3 for Type B using FWI = 15, perform the test procedure defined in ISO/IEC 10373-6:—, H.4.2.3 with WTXM set to 1, 3 and 59.

Perform the test procedure defined in ISO/IEC 10373-6:—, H.3.2.3 with Maximum Frame Size Code set to 'D', 'E' and 'F'.

Perform the test procedure defined in ISO/IEC 10373-6:—, I.3.2 with Bit_Rate_capability byte set to 'FF'.

Perform the test procedure defined in ISO/IEC 10373-6:—, H.3.2.3 with the following:

- step b), check if the extended ATQB option is supported or not by the PCD (bit 5 of REQB PARAM byte);
- step c), if the extended ATQB option is supported by the PCD then the LT answers with ATQB including the optional Extended ATQB byte (optional 4th byte of protocol info field) indicating SFGI = 15;
- step h), the PCD shall send the first I-block after a minimum delay of ~302 µs.

Perform the test procedure defined in ISO/IEC 10373-6:—, H.2.7.3 with FSCI set to 'D', 'E' and 'F'.

Perform the test procedure defined in ISO/IEC 10373-6:—, H.2.8.3 with the following:

- step c), the LT answers with ATS including interface byte TB(1) equal '0F' indicating SFGI = 15;
- step e), the PCD shall send the first I-block after a minimum delay of ~302 µs.