TECHNICAL SPECIFICATION

ISO/IEC TS 24192-1

First edition

Cards and security devices for personal identification — Communication between contactless readers and fare media used in public transport —

Part 1:
Implementation requirements for ISO/IEC 14443 (all parts)

Cartes et dispositifs de sécurité pour l'identification personnelle — Communication entre terminaux et objets sans contact utilisés en transport public —

Partie 1: Exigences d'implémentation pour l'ISO/IEC 14443 (toutes les parties)

PROOF/ÉPREUVE

Reference number
ISO/IEC TS 24192-1:2021(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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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 ISO documents 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 or www.iec.ch/members_experts/refdocs).

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This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology, Information technology,* Subcommittee SC 17, *Cards and security devices for personal identification*.

A list of all parts in the ISO/IEC TS 24192 series can be found on the ISO and IEC website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

This document defines the requirements related to the use of ISO/IEC 14443 (all parts) to ensure interoperability between fare management system terminals and multiple-form-factor contactless fare media (smartcards, e-tickets, mobile phones, USB keys, tablets, etc.).

These implementation requirements are not designed to repeat or duplicate the referenced specifications, essentially ISO/IEC 14443 (all parts) and ISO/IEC 10373-6, but to complement those specifications with public transport specific considerations.

Cards and security devices for personal identification — Communication between contactless readers and fare media used in public transport —

Part 1: Implementation requirements for ISO/IEC 14443 (all parts)

1 Scope

This document defines the technical requirements to be met by contactless public transport (PT) devices in order to be able to interface together using the ISO/IEC 14443 (all parts) contactless communications protocol.

This document applies to PT devices:

— PT readers which are contactless fare management system terminals acting as a PCD contactless reader based on ISO/IEC 14443 (all parts);

— PT objects which are contactless fare media acting as a PICC contactless object based on ISO/IEC 14443 (all parts).

This document addresses interoperability of consumer-market NFC mobile devices, compliant to NFC Forum specifications, with above mentioned PT devices, aligns with ISO/IEC 14443 (all parts) and does not seek to limit compliance for PT readers with EMV Contactless Interface Specification.

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.

ISO/IEC/TS 24192-2, *Cards and security devices for personal identification — Communication between contactless readers and fare media used in public transport — Part 2: Test plan for ISO/IEC 14443 (all parts)*

ISO/IEC 10373-6, *Cards and security devices for personal identification — Test methods — Part 6: Contactless proximity objects*

ISO/IEC 14443 (all parts), *Cards and security devices for personal identification — Contactless proximity objects*

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 terms and definitions given in ISO/IEC 14443-1, ISO/IEC 14443-2, ISO/IEC 14443-3, ISO/IEC 14443-4, ISO/IEC 10373-6 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
common reader
PT reader (3.8) used in interoperable fare management system terminals with reduced performance requirements

Note 1 to entry: See 8.1.

3.2
IFM reader
PT reader (3.8) used in interoperable fare management system terminals

Note 1 to entry: See 8.1.

3.3
NFC mobile device
mobile device capable of near field communication that is offered in the consumer market and is used by PT customers as a contactless object or a contactless reader

3.4
NFC mobile device in card emulation mode
mobile device used as a *PT object* (3.7)

3.5
NFC mobile device in reader/writer mode
mobile device used as a *PT reader* (3.8)

3.6
PT device
PT reader (3.8) or *PT object* (3.7)

3.7
PT object
PICC specifically designed for the use in PT systems

Note 1 to entry: PICC is defined in ISO/IEC 14443 (all parts).

3.8
PT reader
PCD specifically designed for the use in PT systems

Note 1 to entry: PCD is defined in ISO/IEC 14443 (all parts).

4 Symbols and abbreviations

For the purposes of this document, the abbreviations given in ISO/IEC 14443-1, ISO/IEC 14443-2, ISO/IEC 14443-3, ISO/IEC 14443-4, ISO/IEC 10373-6 and the following apply.

ICS implementation conformance statements

NFC near field communication

PT public transport

t_{detect} maximum reference PICC time-to-detection

5 Conformance

To claim conformance to this document, the following requirements shall be met:

— for a PT reader, all the requirements listed in Clause 8 that are applicable according to the applicant's ICS, under the test conditions stipulated in Clause 11 and following the PCD test plan defined in ISO/IEC TS 24192-2;

— for a PT object, all the requirements listed in Clause 9 that are applicable according to the applicant's ICS, under the test conditions stipulated in Clause 11 and following the PICC test plan defined in ISO/IEC TS 24192-2.

Conformance of NFC mobile devices is tested according to NFC Forum specifications and is out of scope of this document.

The description of the certification or qualification processes to be carried out for demonstrating the conformance of PT devices to this document is out of scope of this document.

6 Dual conformance of PT devices to ISO/IEC TS 24192 (all parts) and EMV Contactless Interface Specification

It is acknowledged that next to this document there is also EMV Contactless Interface Specification[1] relevant for many PT devices; therefore this document is developed such that PT devices can comply with the requirements of both EMV Contactless Interface Specification[1] and this document.

7 Interoperability of PT devices and NFC mobile devices

7.1 Description of the “concept for interoperability”

The contactless interface for NFC mobile devices follows the implementation and test specifications of the NFC Forum as specified by the NFC Forum and referenced in GSMA TS.26[3] and TS.27[4].

The ISO/IEC 14443 (all parts) contactless interface of PT devices is designed and tested according to the rules defined in this document.

The concept for interoperability is established to synchronise the specifications for the contactless interface of NFC mobile devices and those for the contactless interface of PT devices in order to:

— facilitate interoperability between NFC mobile devices and PT devices;

— avoid unnecessary test and certification effort.

The NFC Forum conducted a comparison of NFC Analog Specification[5] and NFC Digital Specification[6] with ISO/IEC 14443 (all parts) and ISO/IEC 10373-6. Procedures that support correlation between results from tests according to NFC Forum specifications and those according to ISO/IEC 10373-6 have been defined.

The correlation is used to translate test results from the NFC Forum’s terminology into ISO/IEC 10373-6’s method for describing the relevant parameters. This is the foundation for the following characteristics of the concept for interoperability:

a) Development of PT devices and NFC mobile devices

Despite the fact that different methods for describing the relevant parameters are used, this document and the relevant implementation specifications from the NFC Forum can be synchronised. By synchronising the implementations’ specifications, interoperability is integrated into the design processes of NFC mobile devices and PT devices and makes it a common feature for both types of devices.

b) Test and certification of PT devices and NFC mobile devices

Based on the concept for interoperability it is possible to judge if an NFC mobile device that went through NFC Forum testing is interoperable with a PT device that complies with the requirements for ISO/IEC 14443 (all parts) set out in this document. Therefore, it is sufficient evidence of interoperability to test and certify ISO/IEC 14443 (all parts) conformant PT devices according to ISO/IEC TS 24192-2 and to test and certify NFC mobile devices according to NFC Forum's test and certification procedures.

The detailed methodology used to demonstrate the concept of interoperability between NFC Forum compliant devices and ISO/IEC 14443 (all parts) compliant devices is described in Reference [8].

Table 1 summarizes how contactless communication can be ensured either via conformity testing between PT readers and PT objects or via interoperability testing between PT devices and NFC mobile devices.

Table 1 — Conformity and interoperability matrix for NFC Forum specifications

		Contactless objects	
		PT objects Specified and tested according to ISO/IEC TS 24192	NFC mobile devices in card emulation mode Specified and tested according to NFC Forum specifications
Contactless readers	PT readers (IFM readers and common readers) Specified and tested according to ISO/IEC TS 24192 (all parts)	Conformity based on ISO/IEC TS 24192 (all parts)	Interoperability
	NFC mobile devices in reader/writer mode Specified and tested according to NFC Forum specifications	Interoperability	Conformity based on NFC Forum specifications

7.2 References for implementation and test of NFC mobile devices

The applicable NFC Forum specifications for designing and testing the contactless communication of NFC mobile devices are listed in the Bibliography (References [2] to [7]).

Conformance of NFC mobile devices to these specifications is a prerequisite to ensure interoperability of NFC mobile devices with PT devices as presented in Table 1.

7.3 Limitations

Only parameters, parameter settings or modes of operations that are relevant for PT use cases have been regarded and aligned with for both NFC mobile and PT devices. These use cases are described in the STA document "Documentation of Use Cases for NFC Mobile Devices in Public Transport"[2].

The following parameters, settings or modes are currently not covered by the harmonization of specifications according to the concept for interoperability described in 7.1:

a) communication bit rates higher than $f_c/128$ (~106 kbit/s);

b) peer-to-peer mode according to NFC Forum specifications;

c) ISO/IEC 18092 mode of communication;

d) ISO/IEC 15693-2 mode of communication.

8 Requirements and recommendations applicable to PT readers

8.1 General

8.1.1 Overview

8.2 and 8.3 define requirements; and 8.4 defines recommendations for PT readers.

The requirements and recommendations on PT readers are identified by a numbering format that reads [Rdrnn] where nn is the number of the requirement or recommendation.

There are two categories of PT readers:

— IFM reader;

— common reader.

All implementation requirements and tests that are necessary to achieve interoperability between PT readers and PT objects are mandatory for both PT reader categories.

8.1.2 IFM reader

The first category, the "IFM reader", covers use cases where performances (i.e. operating distance, transaction time, etc.) are key. As shown in Figure 1 and Figure 2, the IFM reader shall offer an operating range that covers the full scope of range A and range B defined in 11.3.3.2 and 11.3.3.4 respectively. All the test positions are defined in Table 3 and Table 4.

Position A1 of range A and Position B1 of range B may be at a different position on the IFM reader, see 11.3.3.

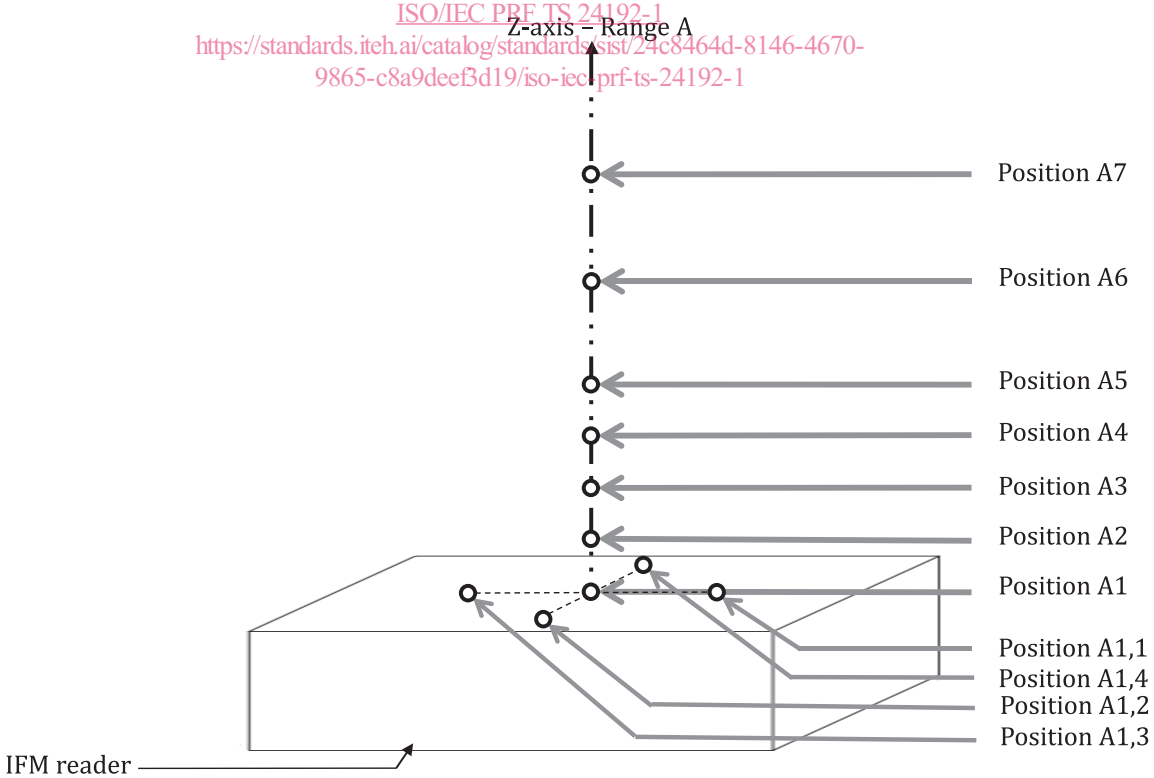

Figure 1 — Range A test positions for IFM reader

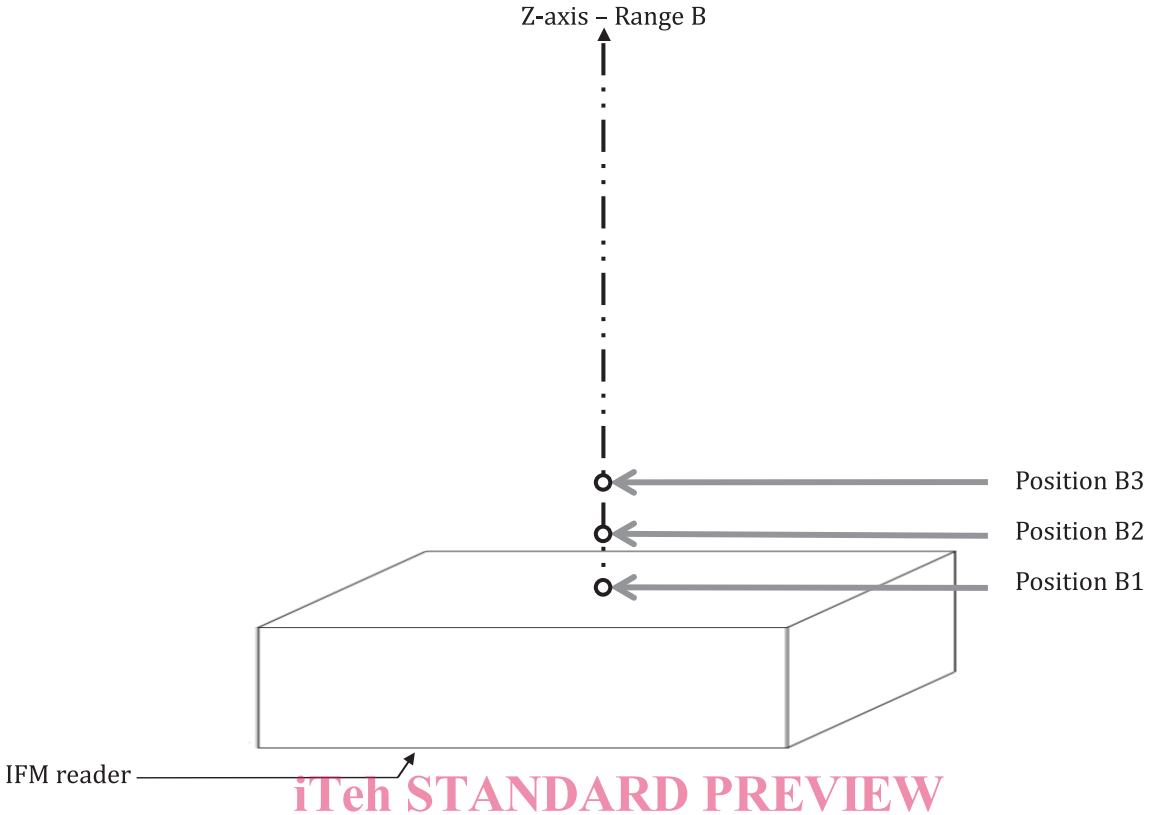

Figure 2 — Range B test positions for IFM reader

8.1.3 Common reader

The second category, the "common reader", is defined for scenarios that impose requirements on the contactless interface such as minimization of cost or maximization of battery life of the PT reader. These requirements have been derived from use cases from the following parts of the PT operator's system implementation which are described in the STA document "Documentation of Use Cases for NFC Mobile Devices in Public Transport"[2]:

a) sales infrastructure;

b) customer's home infrastructure;

c) mobile inspection terminals.

Some requirements given in this document are adapted for common readers.

As shown in Figure 3, the common reader shall offer an operating range that covers a limited subset of range A defined in 11.3.3.2. All the test positions are defined in Table 3.

