SLOVENSKI STANDARD
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Electronic fee collection - Evaluation of onboard and roadside equipment for conformity to ISO 12813 - Part 1: Test suite structure and test purposes

Elektronische Gebührenerhebung - Bewertung der Konformität fahrzeuginterner und straßenseitiger Ausrüstung nach ISO 12813 - Teil 1: Struktur und Zweck des Prüfprogrammes

Perception du télépéage -- Évaluation des équipements embarqués et en bord de route quant à la conformité avec l'ISO 12813 -- Partie 1: Structure de suite d'essais et buts des essais

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03.220.20	Cestni transport	Road transport
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Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to ISO 12813 —

Part 1:
Test suite structure and test purposes

Perception du télépéage — Évaluation des équipements embarqués et en bord de route quant à la conformité avec l'ISO 12813 —

Partie 1: Structure de suite d'essais et buts des essais

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

This second edition of ISO 13143-1 replaces the first edition of this document, ISO 13143-1:2016. It has been technically revised and incorporates the following main modifications compared to ISO 13143-1:2016:

— amendments to reflect changes to the underlying requirements standards, in particular ISO 12813 and ISO 14906;

— amendment of terms, to reflect the harmonization of terms across electronic fee collection (EFC) standards.

A list of all parts in the ISO 13143 series can be found on the ISO website.

Introduction

On-board equipment (OBE) that uses satellite-based positioning technology to collect data required for charging for the use of roads operates in an autonomous way (i.e. without relying on dedicated roadside infrastructure). The OBE will record the amount of road usage in all toll charging systems it passes through.

This document defines the process and tests for evaluation of OBE and roadside equipment (RSE) for conformity to ISO 12813:2019.

ISO 12813:2019 defines requirements for dedicated short-range communication (DSRC) between OBE and an interrogator for the purpose of checking compliance of road use with a local toll regime. It assumes an electronic fee collection (EFC) services architecture according to ISO 17573-1.

This document is intended to

— assess OBE and RSE capabilities,

— assess OBE and RSE behaviour,

— serve as a guide for OBE and RSE conformance evaluation and type approval,

— achieve comparability between the results of the corresponding tests applied in different places at different times, and

— facilitate communication between parties.

This document is based on

— ISO 12813:2019,

— the set of dedicated short-range communication (DSRC) standards defining the communication stack, and

— ISO/IEC 9646.

Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to ISO 12813 —

Part 1:
Test suite structure and test purposes

1 Scope

This document specifies the test suite structure (TSS) and test purposes (TP) to evaluate the conformity of on-board equipment (OBE) and roadside equipment (RSE) to ISO 12813:2019.

It provides a basis for conformance tests for dedicated short-range communication (DSRC) OBE and RSE to support interoperability between different equipment supplied by different manufacturers.

ISO 12813 defines requirements on the CCC interface level, but not for the RSE or OBE internal functional behaviour. Consequently, tests regarding OBE and/or RSE functional behaviour remain outside the scope of this document.

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/FDIS 12813:2019, *Electronic fee collection — Compliance check communication for autonomous systems*

EN 12834:2003, *Road transport and traffic telematics — Dedicated Short Range Communication (DSRC) — DSRC application layer*

EN 13372:2004, *Road Transport and Traffic Telematics (RTTT) — Dedicated short-range communication — Profiles for RTTT applications*

ISO 14906:2018, *Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO 14906:2018/Amd1[1], *Electronic fee collection — Application interface definition for dedicated short-range communication – Amendment 1*

ISO/TS 14907-2:2016, *Electronic fee collection — Test procedures for user and fixed equipment — Part 2: Conformance test for the on-board unit application interface*

EN 15509:2014, *Electronic fee collection — Interoperability application profile for DSRC*

EN 15876-1:2016, *Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to EN 15509 — Part 1: Test suite structure and test purposes*

ETSI/TS 102 486-2-2 V1.2.1 (2008-10), *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Dedicated Short Range Communication (DSRC) transmission equipment; Part 2: DSRC application layer; Sub-Part 2: Test Suite Structure and Test Purposes (TSS&TP)*

[1] Under preparation. (Stage 40.20 at the time of launching of the DIS ballot of this document)

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 https://www.iso.org/obp

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

3.1
access credentials
trusted attestation or secure module that establishes the claimed identity of an object or application

[SOURCE: ISO/TR 17573-2:—, 3.4]

3.2
attribute
addressable package of data consisting of a single data element or structured sequences of data elements

[SOURCE: ISO/TR 17573-2:—, 3.11]

3.3
authentication
security mechanism allowing verification of the provided identity

[SOURCE: EN 301 175 V1.1.1:1998, 3]

3.4
authenticator
data, possibly encrypted, that is used for authentication

[SOURCE: ISO/TR 17573-2:—, 3.14]

3.5
cryptography
principles, means and methods for the transformation of data in order to hide its information content, prevent its undetected modification or prevent its unauthorised use

[SOURCE: ISO/TR 17573-2:—, 3.50]

3.6
data group
class of closely related attributes

[SOURCE: ISO/TR 17573-2:—, 3.52]

3.7
Element
dedicated short-range communication (DSRC) directory containing application information in the form of attributes

[SOURCE: ISO/TR 17573-2:—, 3.69]

3.8
implementation conformance statement
ICS
statement of capabilities and options that have been implemented defining to what extent the implementation is compliant with a given specification

[SOURCE: ISO/TR 17573-2:—, 3.86]

3.9
implementation extra information for testing
IXIT
statement containing all of the information related to the implementation under test (IUT) and its corresponding system under test (SUT) which will enable the testing laboratory to run an appropriate test suite against that IUT

[SOURCE: ISO/IEC 19105:2000, 3.20]

3.10
on-board equipment
OBE
all required equipment on-board a vehicle for performing required EFC functions and communication services

[SOURCE: ISO/TR 17573-2:—, 3.121]

3.11
on-board unit
OBU
single electronic unit on-board a vehicle for performing specific EFC functions and for communication with external systems

[SOURCE: ISO/TR 17573-2:—, 3.122]

3.12
roadside equipment
RSE
equipment located along the road, either fixed or mobile

[SOURCE: ISO/TR 17573-2:—, 3.155]

3.13
tester
combination of equipment, humans and processes able to perform specified conformance tests

[SOURCE: ISO/TR 17573-2:—, 3.180]

3.15
transaction
whole of the exchange of information between two physically separated communication facilities

[SOURCE: ISO/TR 17573-2:—, 3.203]

4 Abbreviated terms

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

AC_CR	Access Credentials
ADU	Application Data Unit
APDU	Application Protocol Data Unit (ISO 14906)
AP	Application Process
ASN.1	Abstract Syntax Notation One (ISO/IEC 8824-1)
ATS	Abstract Test Suite
BI	Behaviour Invalid (i.e. Invalid Behaviour tests)
B-Kernel	Broadcast Kernel
BST	Beacon Service Table (ISO 14906)
BV	Behaviour Valid (i.e. Valid Behaviour tests)
CCC	Compliance Check Communication
cf	Confirm
DLC	Data link Control
DSRC	Dedicated Short-Range Communication (ISO 14906)
DUT	Device Under Test (ISO/TS 14907-2)
EID	Element Identifier
EFC	Electronic Fee Collection (ISO 17573-1)
ICS	Implementation Conformance Statement
LLC	Logical Link Control (EN 12795)
MAC	Medium Access Control (EN 12795)
PCTR	Protocol Conformance Test Report
PDU	Protocol Data Unit
PIXIT	Protocol Implementation eXtra Information for Testing
TP	Test Purpose
TSS	Test Suite Structure
VST	Vehicle Service Table (ISO 14906)

5 Test suite structure (TSS)

5.1 Structure

Table 1 shows the Test suite structure (TSS) including its subgroups that are inherited from other specifications.

Table 1 — Test suite structure

Group	Type of DUT	Behaviour
Physical layer	On-board equipment	Valid behaviour
		Invalid behaviour
	Roadside equipment	Valid behaviour
		Invalid behaviour
Data link Control (DLC) Medium Access Control (MAC) sublayer	On-board equipment	Valid behaviour
		Invalid behaviour
	Roadside equipment	Valid behaviour
		Invalid behaviour
DLC Logical Link Control (LLC) sublayer	On-board equipment	Valid behaviour
		Invalid behaviour
	Roadside equipment	Valid behaviour
		Invalid behaviour
Application layer	On-board equipment	Valid behaviour
		Invalid behaviour
	Roadside equipment	Valid behaviour
		Invalid behaviour

Physical layer tests are to be performed in a radio wave laboratory. They will not form part of the abstract test suite (ATS).

5.2 Reference to conformance test specifications

Conformance to a profile standard implies conformance to the related base standards; hence, a number of test cases for the CCC application are identical to the conformance test cases for the related base standards. Other test cases are derived from the base standards conformance test cases, by applying some restrictions or choices in, for example, the parameters values, according to what is stated in the profile standard. Finally, specific conformance test cases for the CCC application are identified for statements contained in the CCC application, which have no equivalence in the base standards. These latter cases cover for example the application layer data test purposes. This document takes into account already defined test purposes for conformance to the base standards by referencing them, so that:

a) For test purposes that are identical to those defined in the base standards conformance test cases (see e.g. ETSI/TS 102 486-2-2 or EN 15876-1), a direct reference is reported. For reader's convenience, the title or a verbal description of the referenced test purpose is given, together with the reference.

b) For test purposes that are **derived** from those defined in the base standards conformance test cases, a direct reference is reported, plus an indication on how the referred test purpose has been modified for the profile conformance testing.

c) For test purposes that are **specific to the standard profile**, a complete description is given.

An indication on whether a test purpose is **identical**, **derived**, or **specific** is given in each test purpose.

5.3 Test purposes (TP)

5.3.1 TP definition conventions

The TPs are defined following the rules shown in Table 2. All test purposes are defined in Annex A and Annex B.

Table 2 — TP Definition Rules

TP ID according to the TP naming conventions	Title
	Reference
	TP origin
	Initial condition
	Stimulus and expected behaviour

TP ID	The TP ID is a unique identifier. It is specified according to the TP naming conventions defined in the sub-clause below.
Title	Short description of test purpose objective.
Reference	Contains the reference (document, clause, paragraph) to the subject to be validated by the actual TP.
TP origin	Indicates if the TP is **identical** to a TP defined in another test standard, **derived** from a TP defined in another test standard, or **specific** for this standard profile.
Initial condition	The condition defines the required initial state of the DUT at the time of launching of the actual TP
Stimulus and expected behaviour	Definition of the events the tester performs, and the events that are expected from the DUT to conform to the base specification.

5.3.2 TP naming conventions

Each TP is given a unique identification. This unique identification is built up to contain the following string of information:

TP/ <group>/<dut>/<x>-<nn>

TP : to indicate that it is a test purpose;

<group> : which group among those defined in Table 1 does the TP apply to;

<dut> : type of DUT (i.e. OBE or RSE);

<x> : type of testing (i.e. Valid behaviour tests, BV, or Invalid behaviour tests, BI);

<nn> : sequential TP number (01 to 99).

The naming conventions are as described in Table 3.

Table 3 — TP naming convention

Identifier: TP/ <group> / <dut> / <x> - <nn>		
<group>		
applicable for OBU/RSE	PHY	Physical layer
applicable for OBU/RSE	MAC/LLC	MAC/LLC sublayer
applicable for OBU/RSE	AP-BAS	Application layer – I Kernel support
applicable for OBU	AP-FUN	Application layer – T Kernel support
applicable for OBU	AP-DAT	Application layer – Data attributes support
applicable for OBU	AP-SEC	Application layer – Security Level 1 support
applicable for RSE	AP-GET	Application layer - GET-rq PDU test purposes,
applicable for RSE	AP-STA	Application layer - GET-STAMPED-rq PDU test purposes
applicable for RSE	AP-MMI	Application layer - SET-MMI-rq PDU test purposes
applicable for RSE	AP-ECH	Application layer - ECHO-rq PDU test purposes
applicable for RSE	AP-REL	Application layer - EVENT-REPORT-rq PDU test purposes
<dut> = type of DUT	OBU	On-board equipment
	RSE	Roadside equipment
x = Type of testing	BV	Valid behaviour tests
	BI	Invalid behaviour tests
<nn> = sequential number	(01–99)	Test purpose number

5.4 Conformance test report

The manufacturer of the OBE and RSE, respectively, is responsible for providing a conformance test report.

The manufacturer of the OBE shall complete the protocol conformance test report (PCTR) for on-board equipment as defined in Annex C.

The manufacturer of the RSE shall complete the PCTR for roadside equipment as defined in Annex D.