



**International  
Standard**

**ISO 13143**

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

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

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CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

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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 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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 13143 cancels and replaces the second edition of ISO 13143-1:2020, which has been technically revised.

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The main changes are as follows:

- updates have been made to reflect changes in the underlying normative references, in particular ISO 12813, in which data and coding specifications have been revised;
- the terms and definitions have been updated and ISO 17573-2:—<sup>1)</sup> has been included as the primary source for harmonized terminology across electronic fee collection (EFC) standards;
- references to underlying standards have been updated.

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](http://www.iso.org/members.html).

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1) Under preparation. Stage at the time of publication: ISO/DIS 17573-2:2025.

## 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 records the amount of road usage in all toll charging systems it passes through.

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

ISO 12813 specifies requirements for dedicated short-range communication (DSRC) between OBE and an interrogator for the purpose of checking conformance 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.

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

## 1 Scope

This document specifies the test suite structure (TSS) and test purposes (TPs) for evaluating the conformity of on-board equipment (OBE) and roadside equipment (RSE) to ISO 12813.

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 specifies requirements for the compliance check communication (CCC) interface level, but not for the OBE or RSE internal functional behaviour. Consequently, tests regarding OBE and 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 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country code*

ISO 12813:2024, *Electronic fee collection — Compliance check communication for autonomous systems*

ISO 14816, *Road transport and traffic telematics — Automatic vehicle and equipment identification — Numbering and data structure*

ISO 14907-2:2021, *Electronic fee collection — Test procedures for user and fixed equipment — Part 2: Conformance test for the on-board unit application interface*

ISO 17573-2<sup>2)</sup>, *Electronic fee collection — System architecture for vehicle related tolling — Part 2: Vocabulary*

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*

EN 15509:2023, *Electronic fee collection — Interoperability application profile for DSRC*

EN 15876, *Electronic fee collection — Conformity evaluation of on-board and roadside equipment to EN 15509*

ETSI/TS 102 486-2-2:2008, *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)*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17573-2 and the following apply.

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2) Under preparation. Stage at the time of publication: ISO/DIS 17573-2:2025.

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

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

### 3.1

#### **Element**

DSRC directory containing application information in the form of attributes

[SOURCE: ISO 14906:2022, 3.8]

### 3.3

#### **protocol implementation conformance statement**

ICS for an implementation or system claimed to conform to a given protocol specification

[SOURCE: ISO/IEC 9646-1:1994, 3.3.80]

## 4 Abbreviated terms

AC_CR	access credentials
AID	application identifier
APDU	application protocol data unit
AP	application process
ATS	abstract test suite
BI	behaviour invalid (i.e. invalid behaviour tests)
BST	beacon service table
BV	behaviour valid (i.e. valid behaviour tests)
CCC	compliance check communication
DLC	data link control
DSRC	dedicated short-range communication
DUT	device under test
EFC	electronic fee collection
EID	element identifier
ICS	implementation conformance statement
LLC	logical link control
MAC	medium access control
OBE	on-board equipment
PCTR	protocol conformance test report
PDU	protocol data unit
PICS	protocol implementation conformance statement



PIXIT	protocol implementation extra information for testing
RSE	roadside equipment
SCTR	system conformance test report
T-APDU	transfer-application protocol data unit
TP	test purpose
TSS	test suite structure
VST	vehicle service table

## 5 Conformance

The conformance tests shall be performed as specified in [Annex A](#) and [Annex B](#) for OBE and RSE respectively.

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

The conformity assessment body of the OBE shall complete the protocol conformance test report (PCTR) for the OBE as specified in [Annex C](#).

The conformity assessment body of the RSE shall complete the PCTR for the RSE as specified in [Annex D](#).

NOTE The PCTR forms a basis for the manufacturer's declaration of conformity.

## 6 Test suite structure (TSS)

### 6.1 Structure

[Table 1](#) shows the test suite structure (TSS) including its subgroups that are inherited from other specifications.

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**Table 1 — Test suite structure**

Group	Type of DUT	Behaviour
Physical layer	OBE	Valid behaviour (BV)
		Invalid behaviour (BI)
	RSE	BV
		BI
Data link control (DLC) Medium access control (MAC) sublayer	OBE	BV
		BI
	RSE	BV
		BI
DLC Logical link control (LLC) sublayer	OBE	BV
		BI
	RSE	BV
		BI
Application layer	OBE	BV
		BI
	RSE	BV
		BI

Physical layer tests shall be performed in a radio wave laboratory.

## 6.2 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 elements such as the parameters values, according to the elements stated in the profile standard. 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 considers existing test purposes for conformance to the base standards by referencing them, so that:

- a) for test purposes that are identical to those specified in the base standards conformance test cases (see e.g. ETSI/TS 102 486-2-2 or EN 15876), a direct reference is reported;

NOTE For the reader’s convenience, the title or a verbal description of the referenced test purpose is provided, together with the reference.

- b) for test purposes that are derived from those specified in the base standards conformance test cases, a direct reference is reported, plus an indication of 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 provided.

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

## 6.3 Test purposes (TPs)

### 6.3.1 TP definition conventions

The TPs are specified following the template and rules shown in [Table 2](#).

Table 2 — TP definition rules

TP ID according to the TP naming conventions	Title
	Reference
	TP origin
	Initial condition
	Stimulus and expected behaviour
<b>TP ID</b>	The TP ID is a unique identifier. It is specified according to the TP naming conventions defined in <a href="#">6.3.2</a> .
<b>Title</b>	Short description of TP objective.
<b>Reference</b>	Contains the reference (document, clause, paragraph) to the subject to be validated by the actual TP.
<b>TP origin</b>	Indicates if the TP is identical to a TP specified in another test standard, derived from a TP specified in another test standard, or specific for this standard profile.
<b>Initial condition</b>	The condition specifies the required initial state of the device under test (DUT) at the time of launching of the actual TP.
<b>Stimulus and expected behaviour</b>	Definition of the events the tester performs and the events that are expected from the DUT to conform to the base specification.

### 6.3.2 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> : to which group among those specified in [Table 1](#) the TP applies;

<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 conventions**

<group>	<dut>	<x>
applicable for OBE/RSE	PHY	Physical layer
applicable for OBE/RSE	MAC/LLC	MAC/LLC sublayer
applicable for OBE/RSE	AP-BAS	Application layer - I Kernel support
applicable for OBE	AP-FUN	Application layer - T Kernel support
applicable for OBE	AP-DAT	Application layer - Data attributes support
applicable for OBE	AP-SEC	Application layer - Security Level 1 support
applicable for RSE	AP-GET	Application layer - GET-rq protocol data unit (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

## Annex A (normative)

### Test purposes for on-board equipment

#### A.1 General

##### A.1.1 Content

This annex contains the test purposes (TPs) for the conformity evaluation of OBE to ISO 12813.

##### A.1.2 Symbols in TP descriptions

For the application layer test purposes (see [Clause A.4](#)), a special notation and symbol convention is used, as specified in [Table A.1](#).

**Table A.1 — Description of TP symbols**

Symbol	Description
XXX.rq ⇒	The tester sends the XXX.rq protocol data unit (PDU) to the device under test (DUT).
⇐ YYY.rs	The DUT sends the YYY.rs PDU to the tester.
A ≡ B	Test purpose A “is congruent to” test purpose B. The notation “Test purpose A ≡ Test purpose B” means that test purpose A is the same as test purpose B. If differences in parameters or parameter values have to be applied, these differences are indicated in the text immediately below.
A → B	Object A “is transformed” into object B. So, a notation like “Table X → Table Y” means that, for the scope of the TP, any reference of Table X should be changed into a reference to Table Y.
=	Means “assignment”, i.e. a notation like “accessCredentials = a value” means that the field accessCredentials is given a value.
∅	Means “empty” or “not set”, i.e. a notation like “accessCredentials = ∅ → accessCredentials = calculated value”, for a given TP, means “change all occurrences in which the field accessCredentials has not been assigned to a calculation of the value accessCredentials to a given value”.

#### A.2 Physical layer

In accordance with ISO 12813:2024, 5.5.2, all test purposes TP/PHY/OBE/Bx/yy specified in EN 15876 shall be applicable for the conformity evaluation of OBE to CEN-DSRC-based CCC as specified in ISO 12813:2024, Table B.9, Item 1.

#### A.3 MAC and LLC

In accordance with ISO 12813:2024, 5.5.2, all test purposes TP/MAC/OBE/Bx/yy and TP/LLC/OBE/Bx/yy specified in EN 15876 are applicable for the conformity evaluation of OBE to CEN-DSRC-based CCC as specified in ISO 12813:2024, Table B.9, Item 1.

## A.4 Application Layer

### A.4.1 Structure of BST and VST

#### A.4.1.1 BST

The BST general structure, as is transmitted to the OBE, shall be in accordance with [Table A.2](#).

**Table A.2 — BST general structure**

		Length	Allowed values			
T-APDUs		4 bits	'1000' indicating initialisation-request (BST)			
Option indicator		1 bit (nonmandApplications opt.)	0/1			
<b>RSE</b>	manufacturerid	16 bits	In accordance with ISO 14816			
	individualid	27 bits	As specified by manufacturer			
<b>Time</b>		32 bits	UNIX real time			
<b>Profile</b>		1 bit (Profile ext.)	0 (= no extension)			
		7 bits	In accordance with the Profile in EN 13372:2004, 6.3.2			
<b>MandAp- plications</b>			1 bit (mandApplications ext.)	0 (= no extension)		
			7 bits (number of applications)	M		
	CCC applica- tion			1 bit (eid opt.)	0 (= eid not present)	
				1 bit (parameter opt.)	0 (= parameter not present)	
	aid			1 bit (aid ext.)	0 (= no extension)	
				5 bits	20 (= CCC application)	
	Applica- tion 2 (not CCC)			1 bit (eid opt.)	0/1	
				1 bit (parameter opt.)	0/1	
		aid			1 bit (aid ext.)	0 (= no extension)
					5 bits	≠ 20 (= no CCC application)
		eid			1 bit (eid ext.)	0 (= no extension)
					7 bits	Any
		parameter			ApplicationContextMark in accordance with EN 12834:2003, Annex A	
		...	...		...	
	Applica- tion M (not CCC)			1 bit (eid opt.)	0/1	
				1 bit (parameter opt.)	0/1	
aid				1 bit (aid ext.)	0 (= no extension)	
				5 bits	≠ 20 (= no CCC application)	
eid				1 bit (eid ext.)	0 (= no extension)	
				7 bits	Any	
parameter				ApplicationContextMark in accordance with EN 12834:2003, Annex A		

Table A.2 (continued)

		Length	Allowed values
<b>Nonmand Applications</b>		1 bit (mandApplications ext.)	0 (= no extension)
		7 bits (number of applications)	Can be in the range of 0 .. N, provided the maximum framelength is not exceeded.
	Application 1 (not CCC)	Same length and allowed values as in “Application 2 (not CCC)” of mandApplications	
	...	...	
	Application N (not CCC)	Same length and allowed values as in “Application 2 (not CCC)” of mandApplications	
<b>profileList</b>		1 bit (profileList ext.)	0 (= no extension)
		7 bits (number of profiles)	Can be in the range of 0..K provided the maximum framelength is not exceeded.
	Profile 1	1 bit (Profile ext.)	0 (= no extension)
		7 bits	Profile in accordance with EN 12834:2003, Annex A and EN 13372:2004, 6.3.2
	...	...	...
	Profile K	1 bit (Profile ext.)	0 (= no extension)
		7 bits	Profile in accordance with EN 12834:2003, Annex A and EN 13372:2004, 6.3.2

A.4.1.2 VST

The general structure for a VST indicating one CCC application as is transmitted by the OBE shall be in accordance with [Table A.3](#).

In addition to the CCC application the VST may optionally indicate one or more non-CCC applications.

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Table A.3 — VST1 (security level 1): valid VST indicating one CCC application

		Length	Allowed value		
<b>Fill</b>		4 bits	Any		
<b>Profile</b>		1 bit (Profile ext.)	0 (= no extension)		
		7 bits	Profile in accordance with EN 12834:2003, Annex A		
		1 bit (applications ext.)	0 (= no extension)		
		7 bits (number of applic.)	Can be in the range of 0..M depending on OBE support and provided the maximum framelength is not exceeded		
	aid		1 bit (eid opt.)	1 (= eid present)	
			1 bit (parameter opt.)	1 (= parameter present)	
			1 bit (aid ext.)	0 (= no extension)	
			5 bits	20 (= CCC application)	
		eid		1 bit (eid ext.)	0 (= no extension)
				7 bits	Any (≠ other eid used in this VST)