



SLOVENSKI STANDARD
oSIST prEN 15876:2024
01-oktober-2024

**Elektronsko pobiranje pristojbin - Vrednotenje skladnosti opreme v vozilu in v
obcestni napravi s standardom EN 15509**

Electronic fee collection - Conformity evaluation of on-board and roadside equipment to
EN 15509

Elektronische Gebührenerhebung - Konformitätsprüfung von Fahrzeuggeräten und
straßenseitigen Einrichtungen nach EN 15509

Perception de télépéage - Évaluation de la conformité de l'équipement embarqué et de
l'équipement au sol à l'EN 15509

Ta slovenski standard je istoveten z: prEN 15876

oSIST prEN 15876:2024

ICS:

03.220.20	Cestni transport	Road transport
35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport
43.040.15	Avtomobilska informatika. Vgrajeni računalniški sistemi	Car informatics. On board computer systems

oSIST prEN 15876:2024

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 15876

August 2024

ICS

Will supersede EN 15876:2023

English Version

Electronic fee collection - Conformity evaluation of on-board and roadside equipment to EN 15509

Perception de télépéage - Évaluation de la conformité des équipements embarqués et des équipements d'infrastructures en bord de route à l'EN 15509

Elektronische Gebührenerhebung - Konformitätsprüfung von Fahrzeuggeräten und straßenseitigen Einrichtungen nach EN 15509

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 278.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents		Page
European foreword		3
Introduction		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	6
4	Abbreviations	6
5	Conformance	7
6	Test Suite Structure	7
6.1	Structure	7
6.2	Reference to Conformance Specifications	8
6.3	Test Purposes	8
6.3.1	TP Definition Conventions	8
6.3.2	TP Naming Conventions	9
Annex A (normative) Test purposes for on-board equipment		11
Annex B (normative) Test purposes for roadside equipment		68
Annex C (normative) PCTR proforma for on-board equipment		102
Annex D (normative) PCTR proforma for roadside equipment		112
Bibliography		120

oSIST prEN 15876:2024

<https://standards.iteh.ai/catalog/standards/sist/b372ea09-913b-4932-a8d6-ec9d66107bc1/osist-pren-15876-2024>

European foreword

This document (prEN 15876:2024) has been prepared by Technical Committee CEN/TC 278, “Intelligent transport systems”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This fourth edition of EN 15876 incorporates the following main modifications compared with the previous version:

- Correction of the superseded references to ESTI EN 300 674 1:2004 , which are replaced by references to ESTI EN 300 674 2 1:2022, ESTI EN 300 674 2 2:2019 and ETSI TS 104 022:2024;
- Amendments to improve clarity of the document.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[oSIST prEN 15876:2024](https://standards.iteh.ai/catalog/standards/sist/b372ea09-913b-4932-a8d6-ec9d66107bc1/osist-pren-15876-2024)

<https://standards.iteh.ai/catalog/standards/sist/b372ea09-913b-4932-a8d6-ec9d66107bc1/osist-pren-15876-2024>

prEN 15876:2024 (E)

Introduction

CEN/TC 278 has produced a set of standards that support interoperable DSRC-EFC-systems e.g., EN ISO 14906 (a "toolbox" for defining EFC-application transaction) and EN ISO 14907-2 (EFC application interface conformance tests for on-board units). However, these standards are only of an enabling nature and do not ensure technical interoperability. Therefore, EN 15509, *Electronic fee collection – Interoperability application profile for DSRC* was developed to support technical interoperability between EFC-systems.

This document specifies the test suite structure and the test purposes for conformity evaluation of on-board and roadside equipment designed for compliance with the requirements of EN 15509. A test standard for evaluation of conformity of on-board and roadside equipment is a necessary element for coherent, practical and effective appraisal of products' compliance to EN 15509.

EN 15876 provides the necessary foundation for verification of the implementation of the interoperability requirements as stated in EN 15509:

- industry is provided with an easy-to-use toolbox for product assessment;
- operators can easily assess conformity to EN 15509 and reference to the standard in tendering processes;
- authorities and joint undertakings may reference to the test standard when stating interoperability requirements;
- certification organisations are given an effective tool for certification of products.

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[oSIST prEN 15876:2024](https://standards.itih.ai/catalog/standards/sist/b372ea09-913b-4932-a8d6-ec9d66107bc1/osist-pren-15876-2024)

<https://standards.itih.ai/catalog/standards/sist/b372ea09-913b-4932-a8d6-ec9d66107bc1/osist-pren-15876-2024>

1 Scope

This document specifies the test suite structure (TSS) and test purposes (TPs) for evaluation of on-board equipment (OBE) and roadside equipment (RSE) to EN 15509.

Normative Annex A presents the test purposes for the OBE.

Normative Annex B presents the test purposes for the RSE.

Normative Annex C provides the protocol conformance test report (PCTR) proforma for OBE.

Normative Annex D provides the PCTR proforma for RSE.

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.

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

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

EN ISO 3166-1:2020, *Codes for the representation of names of countries and their subdivisions — Part 1: Country code (ISO 3166-1)*

EN ISO 14816:2019, *Road transport and traffic telematics — Automatic vehicle and equipment identification — Numbering and data structure (ISO 14816)*

EN ISO 14906:2023, *Electronic fee collection — Application interface definition for dedicated short-range communication (ISO 14906:2022)*

EN 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 14907-2:2021)*

ISO/TS 17573-2:2020, *Electronic fee collection — Systems architecture for vehicle-related tolling Part 2: Vocabulary*

ETSI TS 104 022:2024, *Transport and Traffic Telematics (TTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5 795 MHz to 5 815 MHz frequency band; performance tests*

ETSI EN 300 674-2-1:2022, *Transport and Traffic Telematics (TTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5 795 MHz to 5 815 MHz frequency band; Part 2: Harmonised Standard for access to radio spectrum; Sub-part 1: Road Side Units (RSU)*

ETSI EN 300 674-2-2:2019, *Transport and Traffic Telematics (TTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in 5 795 MHz to 5 815 MHz frequency band; Part 2: Harmonised Standard for access to radio spectrum; Sub-part 2: On-Board Units (OBU)*

ETSI/TS 102 486-1-2:2008, *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Dedicated Short Range Communication (DSRC) transmission equipment; Part 1: DSRC data link layer: medium access and logical link control; Sub-Part 2: Test Suite Structure and Test Purposes (TSS&TP)*

prEN 15876:2024 (E)

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/TS 17573-2:2020 apply.

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

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

4 Abbreviations

For the purposes of this document, the following abbreviations apply throughout the document unless otherwise specified.

APDU	application protocol data unit
AP	application process
ASN.1	abstract syntax notation one
ATS	abstract test suite
BI	behaviour invalid (i.e., invalid behaviour tests)
BST	beacon service table
BV	behaviour valid (i.e., valid behaviour tests)
DSRC	dedicated short-range communication
EFC	electronic fee collection
ICS	implementation conformance statement
IUT	implementation under test
LLC	logical link control
LPDU	LLC protocol data unit
MAC	medium access control
OBE	on-board equipment
OBU	on-board unit
PCTR	protocol conformance test report
PDU	protocol data unit
PICS	protocol implementation conformance statement
PIXIT	protocol implementation extra information for testing
RSE	roadside equipment
RSU	roadside unit

SCTR	system conformance test report
TP	test purposes
TSS	test suite structure
VST	vehicle service table

5 Conformance

The conformance tests shall be performed as specified in Annex A and Annex B.

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

6.1 Structure

Table 1 shows the test suite structure (TSS) including its subgroups specified for the conformance testing.

Table 1 — Test Suite Structure

Group	Type of IUT	Behaviour
Physical layer	OBE	Valid behaviour
		Invalid behaviour
	RSE	Valid behaviour
		Invalid behaviour
DLC MAC sublayer	OBE	Valid behaviour
		Invalid behaviour
	RSE	Valid behaviour
		Invalid behaviour
DLC LLC sublayer	OBE	Valid behaviour
		Invalid behaviour
	RSE	Valid behaviour
		Invalid behaviour
Application layer – Functions	OBE	Valid behaviour
		Invalid behaviour
	RSE	Valid behaviour
		Invalid behaviour
Application Layer – Data	OBE	Valid behaviour
		Invalid behaviour
	RSE	Valid behaviour
		Invalid behaviour
Application Layer – Security Level 0	OBE	Valid behaviour
		Invalid behaviour
	RSE	Valid behaviour
		Invalid behaviour

prEN 15876:2024 (E)

Group	Type of IUT	Behaviour
Application Layer – Security Level 1	OBE	Valid behaviour
		Invalid behaviour
	RSE	Valid behaviour
		Invalid behaviour
Application Layer – Transactions	OBE	Valid behaviour
		Invalid behaviour
	RSE	Valid behaviour
		Invalid behaviour

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

6.2 Reference to Conformance Specifications

Conformance to a profile standard implies conformance to the related base standards; hence, a number of test cases for the profile standard are exactly the same as 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 e.g. the parameters values, according to the elements stated in the profile standard. Finally, specific conformance test cases for the profile standard are identified for statements contained in the profile standard, which have no equivalence in the base standards. These latter cases cover for example the security algorithms and functions that are specified in the profile standard. This document considers existing conformance test purposes for 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 102 486-1-2:2008 or ETSI/TS 102 486-2-2:2008) 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 specified in the base standards conformance test cases, a direct reference is reported, plus an indication on how the referred test purpose has to be 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.

6.3 Test Purposes

6.3.1 TP Definition Conventions

The TPs are specified in tables with a header that contains a TP ID as specified in the sub-clause 6.3.2 and a title. The content of these tables is following the rules shown in Table 2.

Table 2 — TP Table and Header Content

TP ID	The TP ID is a unique identifier. It is specified according to the TP naming conventions specified in the sub-clause 6.3.2 below.
Title	Short description of Test Purpose objective.
Detailed description	This line is optional and supplements the title.
Reference	The reference contains the references of the subject to be validated by the actual TP (specification reference, clause, and paragraph).
TP origin	It 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 profile standard.
Initial condition	The condition specifies in which initial state the IUT shall be to apply the actual TP.
Stimulus and expected behaviour	Specification of the events the tester shall perform, and the events required by the IUT to conform to EN 15509:2023.

Note that the reference field normally points to the clause of the base standard EN 15509:2023. As the same standard contains the Protocol Implementation Conformance Statement proforma, where appropriate a reference to the relevant table of the PICS is given either in this field or in the text introducing the group of Test Purposes.

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>/<iut>/<x><nn>

- TP : to indicate that it is a Test Purpose;
- <group> : which group among those specified in Table 1 — Test Suite Structure does the TP apply to;
- <iut> : type of IUT (i.e. OBE or RSE);
- X : type of testing (i.e. Valid Behaviour tests – BV, or Invalid Behaviour tests – BI);
- <nn> : sequential TP number (01-99).

The naming conventions are as described in Table 3 — TP Naming Conventions.

Table 3 — TP Naming Conventions

Identifier: TP/<group>/<iut>/<x><nn>		
<group>	PHY	Physical layer
	MAC	MAC sublayer
	LLC	LLC sublayer
	AP-0BAS	Application layer – I Kernel support Security level 0
	AP-0FUN	Application layer – T Kernel support Security level 0
	AP-0DAT	Application layer – Data attributes support Security Level 0
	AP-0SEC	Application layer – Security Level 0 support
	AP-0TRA	Application layer – Transaction support Security level 0
	AP-1BAS	Application layer – I Kernel support Security level 1
	AP-1FUN	Application layer – T Kernel support Security level 1

prEN 15876:2024 (E)

Identifier: TP/<group>/<iut>/<x>-<nn>		
	AP-1DAT	Application layer – Data attributes support Security Level 1
	AP-1SEC	Application layer – Security Level 1 support
	AP-1TRA	Application layer – Transaction support Security level 1
	AP-0BAS	Application layer – Initialisation phase support Security level 0
	AP-0GET	Application layer - GET-rq PDU test purposes, security level 0
	AP-0SET	Application layer - SET-rq PDU test purposes, security level 0
	AP-0STA	Application layer - GET-STAMPED-rq PDU test purposes, security level 0
	AP-0MMI	Application layer - SET-MMI-rq PDU test purposes security level 0
	AP-0ECH	Application layer - ECHO-rq PDU test purposes, security level 0
	AP-0REL	Application layer - EVENT-REPORT-rq PDU test purposes, security level 0
	AP-1BAS	Application layer - initialization phase test purposes, security level 1
	AP-1GET	Application layer - GET-rq PDU test purposes, security level 1
	AP-1SET	Application layer - SET-rq PDU test purposes, security level 1
	AP-1STA	Application layer - GET-STAMPED-rq PDU test purposes, security level 1
	AP-1MMI	Application layer - SET-MMI-rq PDU test purposes security level 1
	AP-1ECH	Application layer - ECHO-rq PDU test purposes, security level 1
<iut> = type of IUT	OBE	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

Annex A (normative)

Test purposes for on-board equipment

A.1 General

This annex specifies the test purposes (TP) for the conformity evaluation of on-board equipment (OBE) to EN 15509:2023.

OBE and OBU have been used as terms with the same or similar meaning in the standardization of DSRC and DSRC-based EFC within CEN and ETSI. Previously developed relevant standards used the term OBU with the meaning OBE as specified in this document. When referring to relevant tests in other documents, this document uses the terms of the referenced source, which explains why the term OBU is often used in this Annex.

A.2 Physical Layer

A.2.1 BV Test Purposes

Table A.1 to Table A.9 specify the physical layer BV test purposes.

Test subgroup objective:

- to test the behaviour of the IUT in relation to syntactically and contextual correct behaviour of the test system.

Table A.1 — TP/PHY/OBU/BV/01 — Dynamic range - sensitivity

TP Origin	Identical to ETSI EN 300 674-2-2:2019, Clause 5.3.2.2.
Reference	EN 15509:2023, 6.1.2
Initial condition	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.2.2.1.
Stimulus and Expected Behaviour	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.2.2 and Clause 4.3.2.2.

Table A.2 — TP/PHY/OBU/BV/02 — Dynamic range - upper power limit for communication

TP Origin	Identical to ETSI TS 104 022:2024, Clause 9.1.
Reference	EN 15509:2023, 6.1.2
Initial condition	In accordance with ETSI TS 104 022:2024, Clause 9.1.1.
Stimulus and Expected Behaviour	In accordance with ETSI TS 104 022:2024, Clause 9.1 and Clause 7.2.1. .

Table A.3 — TP/PHY/OBU/BV/03 — Cut-off power level

TP Origin	Identical to ETSI TS 104 022:2024, Clause 9.2.
Reference	EN 15509:2023, 6.1.2
Initial condition	In accordance with ETSI TS 104 022:2024, Clause 9.2.1.
Stimulus and Expected Behaviour	In accordance with ETSI TS 104 022:2024, Clause 9.2 and Clause 7.2.2.

Table A.4 — TP/PHY/OBU/BV/04 — Conversion gain

TP Origin	Identical to ETSI TS 104 022:2024, Clause 9.3.
Reference	EN 15509:2023, 6.1.2
Initial condition	In accordance with ETSI TS 104 022:2024, Clause 9.3.1.
Stimulus and Expected Behaviour	In accordance with ETSI TS 104 022:2024, Clause 9.3 and Clause 7.2.3.

Table A.5 — TP/PHY/OBU/BV/05 — Maximum equivalent isotropic radiated power

TP Origin	Identical to ETSI EN 300 674-2-2:2019, Clause 5.3.1.2.
Reference	EN 15509:2023, 6.1.2
Initial condition	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.1.2.1.
Stimulus and Expected Behaviour	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.1.2 and Clause 4.3.1.2.

Table A.6 — TP/PHY/OBU/BV/06 — Frequency error

TP Origin	Identical to ETSI EN 300 674-2-2:2019, Clause 5.3.1.3.
Reference	EN 15509:2023, 6.1.2
Initial condition	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.1.3.1.
Stimulus and Expected Behaviour	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.1.3 and Clause 4.3.1.3.

Table A.7 — TP/PHY/OBU/BV/07 — Transmitter spectrum mask

TP Origin	Identical to ETSI EN 300 674-2-2:2019, Clause 5.3.1.1.
Reference	EN 15509:2023, 6.1.2
Initial condition	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.1.1.1.
Stimulus and Expected Behaviour	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.1.1 and Clause 4.3.1.1.

Table A.8 — TP/PHY/OBU/BV/08 — Transmitter unwanted emissions

TP Origin	Identical to ETSI EN 300 674-2-2:2019, Clause 5.3.1.4.
Reference	EN 15509:2023, 6.1.2
Initial condition	In accordance with ETSI EN 300 674-2-2:2019, Clause 5.3.1.4.1.
Stimulus and Expected Behaviour	In accordance with ETSI EN 300 674-2-2:2019, , Clause 5.3.1.4 and Clause 4.3.1.4.