

DIN EN 15876-1



ICS 35.240.60

Entwurf

Einsprüche bis 2022-07-20
Vorgesehen als Ersatz für
DIN EN 15876-1:2016-12

**Elektronische Gebührenerhebung –
Konformitätsprüfung von Fahrzeuggeräten und straßenseitigen
Einrichtungen nach EN 15509 –
Teil 1: Struktur und Zweck des Prüfprogramms;
Englische Fassung prEN 15876-1:2022**

Electronic fee collection –
Conformity evaluation of on-board and roadside equipment to EN 15509 –
Part 1: Test suite structure and test purposes;
English version prEN 15876-1:2022

Perception de télépéage –
Evaluation de conformité de l'équipement embarqué et de l'équipement au sol à la
EN 15509 –
Partie 1: Structure des suites de tests et intention des tests;
Version anglaise prEN 15876-1:2022

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Nationales Vorwort

Dieses Dokument (prEN 15876-1:2022) wurde vom Technischen Komitee ISO/TC 204 „Intelligent Transport Systems“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 278 „Intelligente Verkehrssysteme“, dessen Sekretariat von NEN (Niederlande) gehalten wird, erarbeitet.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-00-71 GA „Gemeinschaftsarbeitsausschuss NAAutomobil/DKE: Intelligente Verkehrssysteme“ des DIN-Normenausschusses Automobiltechnik (NAAutomobil).

Dieses Dokument ist derzeit zur parallelen Abstimmung vorgelegt.

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die englische Originalfassung von EN 15876-1.

Innerhalb von CEN/TC 278 wurden Normen zur Unterstützung kompatibler DSRC-EFC-Systeme, wie zum Beispiel EN ISO 14906 und CEN ISO/TS 14907-2, definiert. Trotzdem haben diese Normen nur einführenden Charakter und garantieren keine umfassende technische Kompatibilität. Deswegen wurde EN 15509 entwickelt, um technische Interoperabilität zwischen EFC-Systemen zu gewährleisten.

Dieses Dokument legt die Struktur der Testprogramme sowie Konformitätsprüfungen nach den Anforderungen fest, welche in EN 15509 definiert sind.

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

Änderungen

Gegenüber DIN EN 15876-1:2016-12 wurden folgende Änderungen vorgenommen:

- a) wurde erweitert, um Änderungen in den zugrundeliegenden Anforderungsnormen, speziell in EN 15509, zu berücksichtigen;
- b) wurde erweitert, um Änderungen in EN ISO 14907-2 zu berücksichtigen;
- c) Überarbeitung der Begriffe, basierend auf der harmonisierten technischen Spezifikation ISO/TS 17573-2.

Nationaler Anhang NA (informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

- IEC Electropedia: verfügbar unter <http://www.electropedia.org/>
- ISO Online Browsing Platform: verfügbar unter <http://www.iso.org/obp>

3.1

Attribut

en attribute

adressierbares Datenpaket, welches aus einem einzelnen Datenelement oder strukturierten Sequenzen von Datenelementen besteht

[QUELLE: ISO/TS 17573-2:2020, 3.13]

3.2

Authentifikator

en authenticator

Daten, wenn möglich verschlüsselt, die zur Authentifizierung verwendet werden

[QUELLE: ISO/TS 17573-2:2020, 3.16]

3.3

Datengruppe

en data group

Klasse von verwandten Attributen

[QUELLE: ISO/TS 17573-2:2020, 3.55]

3.4

Element

EFC-Element

schlüssige Menge von Datenmengen und Funktionalitäten

Anmerkung 1 zum Begriff: Die Funktionalitäten beinhalten, wenn vorhanden, die sicherheitsbezogenen Funktionen, sowie die dazugehörigen Sicherheitsschlüssel.

Anmerkung 2 zum Begriff: EFC-Elemente werden von den Anwendungen erstellt und mittels Elementbezeichner adressiert.

Anmerkung 3 zum Begriff: In einer vorhandenen *fahrzeuginternen Einrichtung* (OBE) (3.9), wird die EID dazu verwendet, um einen Mautinhalt zu adressieren, gekennzeichnet durch das EFC-ContextMark, in dem *Attribute* (3.1) eindeutig durch *AttributesIDs* innerhalb eines EFC-Elementes der OBE, adressiert werden können.

[QUELLE: ISO/TS 17573-2:2020, 3.71]

3.5

Erklärung zur Konformität der Implementierung

ICS, en: implementation conformance statement

Erklärung bezogen auf die implementierte Leistungsfähigkeit und Optionen, die festlegt, in welchem Ausmaß die Implementierung zu einer gegebenen Spezifikation konform ist

[QUELLE: ISO/TS 17573-2:2020, 3.90]

3.6

Formular für die Erklärung zur Konformität der Implementierung

en implementation conformance statement proforma

Dokument in Form eines Fragebogens, das, wenn es für eine Implementierung oder ein System ausgefüllt wird, zu einer *Erklärung zur Konformität der Implementierung* (3.5) wird

[QUELLE: ISO/TS 17573-2:2020, 3.91]

3.7

Zusatzinformation zur Prüfung der Implementierung

IXIT, en: implementation extra information for testing

Aufstellung aller Informationen bezogen auf die zu prüfende Implementierung (IUT, en: implementation under test) und das korrespondierende zu prüfende System (SUT, en: system under test), die das Prüflabor befähigen, die entsprechende Testreihe gegen die IUT durchzuführen

[QUELLE: ISO/TS 17573-2:2020, 3.92]

3.8

Zusatzinformation zur Prüfung der Implementierung

en implementation extra information for testing proforma

Dokument in Form eines Fragebogens, das, wenn es für eine zu testende Implementierung ausgefüllt wird, zur Zusatzinformation zur Prüfung der Implementierung (3.7) wird

[QUELLE: ISO/TS 17573-2:2020, 3.93]

3.9

fahrzeuginterne Einrichtung

OBE, en: on-board equipment

alle erforderlichen Einrichtungen im Fahrzeug, die zur Durchführung spezifischer Funktionen zur elektronischen Gebührenerhebung und notwendiger Kommunikationsdienste benötigt werden

[QUELLE: ISO/TS 17573-2:2020, 3.126]

3.10

fahrzeuginterne Einheit

OBU, en: on-board unit

elektronische Einheit innerhalb eines Fahrzeugs zur Durchführung spezifischer Funktionen der elektronischen Gebührenerhebung und zur Kommunikation mit externen Systemen

Anmerkung 1 zum Begriff: OBU und OBE wurden als Begriffe mit derselben, oder ähnlichen Bedeutung in der Normung von DSRC und DSRC-basierter EFC innerhalb von CEN und ETSI verwendet. Zuvor entwickelte, relevante Normen verwendeten den Begriff OBU mit der Bedeutung der OBE nach der Festlegung in diesem Dokument. Wenn relevante Prüfungen in anderen Dokumenten referenziert werden, verwendet dieses Dokument die Begriffe der referenzierten Quelle, die erklärt, warum der Begriff OBU oftmals in Anhängen verwendet wird.

[QUELLE: ISO/TS 17573-2:2020, 3.127]

3.11

Straßenrand-Einrichtung

RSE, en: roadside equipment

feste oder bewegliche Einrichtung zur elektronischen Gebührenerhebung, angeordnet entlang der Straße

Anmerkung 1 zum Begriff: RSE und RSU wurden als Begriffe mit derselben, oder ähnlichen Bedeutung in der Normung von DSRC und DSRC-basierter EFC innerhalb von CEN und ETSI verwendet. Zuvor entwickelte, relevante Normen verwendeten den Begriff RSU mit der Bedeutung der RSE nach der Festlegung in diesem Dokument. Wenn relevante Prüfungen in anderen Dokumenten referenziert werden, verwendet dieses Dokument die Begriffe der referenzierten Quelle, die erklärt, warum der Begriff RSU oftmals in Anhängen verwendet wird.

[QUELLE: ISO/TS 17573-2:2020, 3.161]

3.12

Tester

en tester

Kombination von Gerät, Personen und Prozesse die spezifische Konformitätsprüfungen durchführen kann

[QUELLE: ISO/TS 17573-2:2020, 3.188]

3.13

Vorgang

en transaction

Gesamtheit eines Informationsaustauschs zwischen zwei physikalisch getrennten Kommunikationseinrichtungen

[QUELLE: ISO/TS 17573-2:2020, 3.211]

— Leerseite —

English Version

Electronic fee collection - Conformity evaluation of on-board and roadside equipment to EN 15509 - Part 1: Test suite structure and test purposes

Perception de télépéage ; Evaluation de conformité de l'équipement embarqué et de l'équipement au sol à la EN 15509 ; Partie 1 : Structure des suites de tests et intention des tests

Elektronische Gebührenerhebung - Konformitätsprüfung von Fahrzeugsgeräten und straßenseitigen Einrichtungen mit der EN 15509 - Teil 1: Prüfreihestruktur und Prüfzweck

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.

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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.

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

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

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European foreword

This document (prEN 15876-1:2022) 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 document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document will supersede EN 15876-1:2016.

This edition of EN 15876-1 incorporates the following main modifications compared with the previous version:

- amendments to reflect changes to the underlying requirements standards, in particular the updated data definitions in EN 15509;
- amendments to reflect changes in EN ISO 14907-2, specifically updated references following its amended structure,
- updated terms to reflect the harmonized terms between electronic fee collection standards in ISO/TS 17573-2.

Introduction

CEN/TC 278 has produced a set of standards that support interoperable DSRC-EFC-systems e.g. prEN ISO/DIS 14906:2022 (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 defines 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.

This document forms Part 1 of a two-part standard:

- EN 15876-1, *Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to EN 15509 — Part 1: Test suite structure and test purposes*
- EN 15876-2, *Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to EN 15509 — Part 2: Abstract test suites*

Together, the two parts of EN 15876 provide 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.

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.

FprEN 15509:2022, *Electronic fee collection — Interoperability application profile for DSRC*

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

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

prEN ISO/DIS 14906:2022, *Electronic fee collection — Application interface definition for dedicated short-range communication*

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)*

3 Terms and definitions

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

3.1

attribute

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

[SOURCE: ISO/TS 17573-2:2020, 3.13]

3.2

authenticator

data, possibly encrypted, that is used for authentication

[SOURCE: ISO/TS 17573-2:2020, 3.16]

3.3

data group

class of closely related attributes

[SOURCE: ISO/TS 17573-2:2020, 3.55]

3.4

Element

EFC Element

coherent set of data and functionality

Note 1 to entry: The functionality includes, where applicable, the security-related functions and the associated security keys.

Note 2 to entry: EFC Elements are created by the applications and addressed using Element identifiers.

Note 3 to entry: In a given *on-board equipment* (OBE) (3.9), the EID is used to address a toll context, identified by the EFC-ContextMark, in which *attributes* (3.1) can be addressed unambiguously by AttributeIDs inside an EFC Element of the OBE

[SOURCE: ISO/TS 17573-2:2020, 3.71]

3.5

implementation conformance statement

ICS

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

[SOURCE: ISO/TS 17573-2:2020, 3.90]

3.6

implementation conformance statement proforma

document, in the form of a questionnaire, which when completed for an implementation or system becomes an *implementation conformance statement* (3.5)

[SOURCE: ISO/TS 17573-2:2020, 3.91]

3.7

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/TS 17573-2:2020, 3.92]

3.8

implementation extra information for testing proforma

document, in the form of a questionnaire, which when completed for an IUT becomes an implementation extra information for testing (3.7)

[SOURCE: ISO/TS 17573-2:2020, 3.93]

3.9

on-board equipment

OBE

all required equipment on-board a vehicle for performing required electronic fee collection functions and communication services

[SOURCE: ISO/TS 17573-2:2020, 3.126]

3.10

on-board unit

OBU

electronic unit on-board a vehicle for performing specific electronic fee collection functions and for communication with external systems

Note 1 to entry: 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 defined 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 the Annexes.

[SOURCE: ISO/TS 17573-2:2020, 3.127]

3.11

roadside equipment

RSE

fixed or movable electronic fee collection equipment located along the road

Note 1 to entry: RSE and RSU 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 RSU with the meaning RSE as defined 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 RSU is often used in the Annexes

[SOURCE: ISO/TS 17573-2:2020, 3.161]

3.12

tester

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

[SOURCE: ISO/TS 17573-2:2020, 3.188]

3.13

transaction

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

[SOURCE: ISO/TS 17573-2:2020, 3.211]

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 (ISO/IEC 8824-1)
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
OBUE	on-board unit
PCTR	protocol conformance test report
PDU	protocol data unit
PICS	protocol implementation conformance statement
PIXIT	protocol implementation extra information for testing
SCTR	system conformance test report
TP	test purposes
TSS	test suite structure
VST	vehicle service table

5 Conformance

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

The supplier of the OBE shall complete the protocol conformance test report (PCTR) for the OBE as defined in Annex C.

The supplier of the RSE shall complete the PCTR for the RSE as defined in Annex D.

6 Test Suite Structure

6.1 Structure

The table below shows the test suite structure (TSS) including its subgroups defined 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

Group	Type of IUT	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
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 what is 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 described in the profile standard. 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 102 486-1-2 or ETSI/TS 102 486-2-2) 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 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 defined following the rules shown in Table 2 below.

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 shall be specified according to the TP naming conventions defined in the sub-clause below.
Title	Short description of Test Purpose objective.
Reference	The reference should contain the references of the subject to be validated by the actual TP (specification reference, clause, and paragraph).
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 profile standard.
Initial condition	The condition defines in which initial state the IUT has to be to apply the actual TP.
Stimulus and expected behaviour	Definition of the events the tester performs, and the events that are expected from the IUT to conform to the base specification.

Note that the reference field normally points to the clause of the base standard EN 15509. 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 defined 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 below.

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 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

Identifier TP/<group>/<iut>/< : x>-<nn>		
	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 Introduction

This annex contains the test purposes (TP) for the conformity evaluation of on-board equipment (OBE) to FprEN 15509:2022.

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 defined 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

Test subgroup objective:

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

TP/PHY/OBU/BV/01	Dynamic range – sensitivity
TP Origin	Identical to ETSI EN 300 674–1, 10.1.1
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674–1, Clause 8.
Stimulus and Expected Behaviour	
See ETSI EN 300 674–1, 10.1.1	

TP/PHY/OBU/BV/02	Dynamic range – upper power limit for communication
TP Origin	Identical to ETSI EN 300 674–1, 10.1.2
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674–1, Clause 8.
Stimulus and Expected Behaviour	
See ETSI EN 300 674–1, 10.1.2	

TP/PHY/OBU/BV/03	Cut-off power level
TP Origin	Identical to ETSI EN 300 674-1, 10.2
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674-1, Clause 8.
Stimulus and Expected Behaviour	
See ETSI EN 300 674-1, 10.2	

TP/PHY/OBU/BV/04	Conversion gain
TP Origin	Identical to ETSI EN 300 674-1, 10.3
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674-1, Clause 8.
Stimulus and Expected Behaviour	
See ETSI EN 300 674-1, 10.3	

TP/PHY/OBU/BV/05	Maximum equivalent isotropically radiated power
TP Origin	Identical to ETSI EN 300 674-1, 10.4
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674-1, Clause 8.
Stimulus and Expected Behaviour	
See ETSI EN 300 674-1, 10.4	

TP/PHY/OBU/BV/06	Frequency error
TP Origin	Identical to ETSI EN 300 674-1, 10.5
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674-1, Clause 8.
Stimulus and Expected Behaviour	
See ETSI EN 300 674-1, 10.5	

TP/PHY/OBU/BV/07	Transmitter spectrum mask
TP Origin	Identical to ETSI EN 300 674-1, 10.6
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674-1, Clause 8.
Stimulus and Expected Behaviour	
See ETSI EN 300 674-1, 10.6	

TP/PHY/OBU/BV/08	Transmitter unwanted emissions
TP Origin	Identical to ETSI EN 300 674-1, 10.7
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674-1, Clause 8.
Stimulus and Expected Behaviour See ETSI EN 300 674-1, 10.7	

TP/PHY/OBU/BV/09	Receiver spurious emissions
TP Origin	Identical to ETSI EN 300 674-1, 10.8
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI EN 300 674-1, Clause 8.
Stimulus and Expected Behaviour See ETSI EN 300 674-1, 10.8	

A.2.2 BI Test Purposes

BI test purposes group do not apply for Layer 1.

A.3 MAC

A.3.1 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.

TP/MAC/OBU/BV/01	Receive downlink frames – maximum length
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/01
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/01
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/01	

TP/MAC/OBU/BV/02	Receive downlink frames within T1
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/02
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/02
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/02	

TP/MAC/OBU/BV/03	Timing constraints for public uplink windows
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/03
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/03
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/03	

TP/MAC/OBU/BV/04	Receive downlink frames within T2
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/04
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/04
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/04	

TP/MAC/OBU/BV/05	Timing constraints for private uplink windows
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/05
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/05
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/05	

TP/MAC/OBU/BV/06	S-bit and L-bit in MAC control field
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/06
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/06
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/06	

TP/MAC/OBU/BV/07	Manage S-bit state variable
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/07
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/07
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/07	

TP/MAC/OBU/BV/08	Random selection of N5 public uplink windows
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/08
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/08
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BV/08	

A.3.2 BI Test Purposes

Test subgroup objective:

- to check the behaviour of the IUT in response to invalid stimuli and behaviour from the test tool.

TP/MAC/OBU/BI/01	Manage double-bit errors in the LID, MAC control and LPDU fields
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/01
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/01
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/01	

TP/MAC/OBU/BI/02	Detect and manage double-bit errors in the FCS field
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/02
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/02
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/02	

TP/MAC/OBU/BI/03	Detect and manage a block of 15 bit errors
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/03
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/03
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/03	

TP/MAC/OBU/BI/04	Detect and manage the abort sequence in the LPDU field
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/04
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/04
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/04	

TP/MAC/OBU/BI/05	Detect and manage the abort sequence at the end of a downlink frame
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/05
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/05
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/05	

TP/MAC/OBU/BI/06	Detect and manage a too long downlink frame according to N₂
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/06
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/06
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/06	

TP/MAC/OBU/BI/07	Detect and manage wrong format of LID
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/07
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/07
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/07	

TP/MAC/OBU/BI/08	Detect and manage missing MAC control field
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/08
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/08
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/08	

TP/MAC/OBU/BI/09	Detect and manage wrong A-bit in MAC control field in broadcast frame
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/09
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/09
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/09	

TP/MAC/OBU/BI/10	Detect and manage wrong D-bit in MAC control field in broadcast frame
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/10
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/10
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/10	

TP/MAC/OBU/BI/11	Detect and manage wrong D-bit in MAC control field in private frame
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/11
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/11
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/11	

TP/MAC/OBU/BI/12	Detect and manage wrong L-bit in MAC control field in broadcast frame
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/12
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/12
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/12	

TP/MAC/OBU/BI/13	Detect and manage wrong L-bit in MAC control field in private frame
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/13
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/13
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/13	

TP/MAC/OBU/BI/14	Detect and manage wrong C/R-bit in MAC control field of a PrWa frame
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/14
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/14
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/14	

TP/MAC/OBU/BI/15	Detect and manage a wrong MAC control field
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/15
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/15
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/15	

TP/MAC/OBU/BI/16	Detect and manage blocked signals
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/16
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/16
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/16	

TP/MAC/OBU/BI/17	Detect and manage blocked end flag
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/17
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/17
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/17	

TP/MAC/OBU/BI/18	Detect and manage blocked start flag
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/18
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/18
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/18	

TP/MAC/OBU/BI/19	Detect and manage broadcast LID where expecting private LID
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/19
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/19
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/19	

TP/MAC/OBU/BI/20	Detect and manage multicast LID where expecting private LID
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/20
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/20
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/20	

TP/MAC/OBU/BI/21	Detect and manage wrong A-bit in MAC control field in private frame
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/21
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/21
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/21	

TP/MAC/OBU/BI/22	Manage wrong A-bit in MAC control field in private downlink frame with ACn
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/22
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/22
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/22	

TP/MAC/OBU/BI/23	Detect and manage wrong private LID
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/23
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/23
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/23	

TP/MAC/OBU/BI/24	Verify that the OBU can manage retransmission of PrWRq
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/24
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/24
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/MAC/OBU/BI/24	

A.4 LLC

A.4.1 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.

TP/LLC/OBU/BV/01	Exchange UI commands
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/01
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/01
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/01	

TP/LLC/OBU/BV/02	Manage ACn data transmission
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/02
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/02
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/02	

TP/LLC/OBU/BV/03	Manage ACn data exchange
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/03
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/03
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/03	

TP/LLC/OBU/BV/04	Empty Test Purpose, left to keep numbering aligned with ETSI/TS 102 486-1-2
TP Origin	
Reference	
Initial condition	
Stimulus and Expected Behaviour	

TP/LLC/OBU/BV/05	Manage data response Procedure I
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/05
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/05
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/OBU/BV/05	

A.4.2 BI Test Purposes

Test subgroup objective:

- to check the behaviour of the IUT in response to invalid stimuli and behaviour from the test tool.

TP/LLC/OBU/BI/01	Detect and manage corrupted LLC control field when expecting UI command
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/01
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/01
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/01	

TP/LLC/ObU/BI/02	Detect and manage invalid LPDU with fractional number of octets in length
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/02
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/02
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/02	

TP/LLC/ObU/BI/03	Detect and manage corrupted LLC control field when expecting ACn command
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/03
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/03
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/03	

TP/LLC/ObU/BI/04	Detect and manage LPDU containing acknowledged connectionless LLC command control field when LID is multicast or broadcast
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/04
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/04
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/04	

TP/LLC/ObU/BI/05	Detect and manage invalid LPDU with fractional number of octets in length
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/05
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/05
Stimulus and Expected Behaviour	
See ETSI/TS 102 486-1-2 TP/LLC/ObU/BI/05	

TP/LLC/OBU/BI/06	Detect and manage an invalid ACn command with P = 1 and no LSDU.
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/06
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/06
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/06	

TP/LLC/OBU/BI/07	Detect and manage duplicate ACn commands
TP Origin	Identical to ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/07
Reference	FprEN 15509:2022, 6.1.2
Initial condition	See ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/07
Stimulus and Expected Behaviour See ETSI/TS 102 486-1-2 TP/LLC/OBU/BI/07	

A.5 Application Layer

A.5.1 Introduction and general conventions

For the application layer test purposes, a special notation and symbol convention is used, as defined below.

Symbols are used in the description of the TPs, with meanings according to Table A.1 below.

Table A.1 — Description of TP Symbols

SYMBOL	DESCRIPTION
$XXX.rq \Rightarrow$	The Tester sends the XXX.rq PDU to the IUT
$\Leftarrow YYY.rs$	The IUT sends the YYY.rs PDU to the Tester
$A \equiv B$	Test Purpose A “is congruent to” Test Purpose B. The notation Test Purpose A $\equiv$ Test Purpose B means that the 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.
$A \rightarrow B$	Object A “is transformed” into Object B. So a notation like “Table X $\rightarrow$ Table Y” means that, for the scope of the Test Purpose, any reference of Table X should be changed into references to Table Y.
=	Means “assignment”. That is, a notation like “accessCredentials = a value” means that the field accessCredentials is given a value.
$\emptyset$	Means “empty” or “not set”. So, a notation like “accessCredentials = $\emptyset$ $\rightarrow$ accessCredentials = calculated value”, for a given Test Purpose, means “change all occurrences in which the field accessCredentials has not been assigned to calculation of the value accessCredentials to a given value”.

A.5.2 Structure of BST and VST

A.5.2.1 BST

The BST general structure, as is *transmitted* to the OBU, is described in Table A.2 — BST, General Structure, below.

Table A.2 — BST, General Structure

			Length	Allowed Values
T-APDUs			4 bit	'1000' indicating initialisation-request (BST)
			1 bit (nonmandApplications opt.)	0/1
rsu	manufacturerid		16 bits	See ISO 14816
	individualid		27 bits	as specified by manufacturer
time			32 bits	UNIX real time
profile			1 bit (Profile ext.)	0 (= no extension)
			7 bits	See Profile in [EN 12834] Annex A
mandApplications			1 bit (mandApplications ext.)	0 (= no extension)
			7 bits (number of applications)	M
	<i>EFC Application</i>		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	1 (= electronic-fee-collection)
	<i>Application 2 (not EFC)</i>		1 bit (eid opt.)	0/1
			1 bit (parameter opt.)	0/1
		aid	1 bit (aid ext.)	0 (= no extension)
			5 bits	See DSRCApplicationEntityID in [EN 12834] Annex A
		eid	1 bit (eid ext.)	0 (= no extension)
			7 bits	any
		parameter		See ApplicationContextMark in [EN 12834] Annex A
	...		...	...
	<i>Application M (not EFC)</i>		1 bit (eid opt.)	0/1
			1 bit (parameter opt.)	0/1
		aid	1 bit (aid ext.)	0 (= no extension)
			5 bits	See DSRCApplicationEntityID in [EN 12834] Annex A
		eid	1 bit (eid extension)	0 (= no extension)
			7 bits	any
		parameter		See ApplicationContextMark in [EN 12834] Annex A

		Length	Allowed Values
nonmandAp plications		1 bit (mandApplications ext.)	0 (= no extension)
		7 bits (number of applications)	N
	Application 1 (not EFC)	...	See “Application 2 (not EFC)” of mandApplications
	...	...	...
	Application N (not EFC)	...	See “Application 2 (not EFC)” of mandApplications
profileList		1 bit (profileList ext.)	0 (= no extension)
		7 bits (number of profiles)	K
	Profile 1	1 bit (Profile ext.)	0 (= no extension)
		7 bits	See Profile in [EN 12834] Annex A
	...	...	...
	Profile K	1 bit (Profile ext.)	0 (= no extension)
		7 bits	See Profile in [EN 12834] Annex A

A.5.2.2 VST

The VST general structure, as is *transmitted* by the OBU, is described in Table A.3 — VST, General Structure and Table A.4 — VST, General Structure (security level 1) below.

Table A.3 — VST, General Structure

					Length	Allowed Values		
T-APDUs					4 bits	'1001' indicating initialisation-response (VST)		
fill					4 bits	'0000'		
profile					1 bit (Profile ext.)	0 (= no extension)		
					7 bits	See Profile in [EN 12834] Annex A		
applications	EFC Application				1 bit (applications ext.)	0 (= no extension)		
					7 bits (number of applic.)	M		
						1 bit (eid opt.)	1 (= eid present)	
						1 bit (parameter opt.)	1 (= parameter present)	
			aid				1 bit (aid ext.)	0 (= no extension)
							5 bits	1 (= electronic-fee-collection)
		eid				1 bit (eid ext.)	0 (= no extension)	
						7 bits	any (≠ other eid used in this VST)	
		parameter					1 bit (Container ext.)	0 (= no extension)
							7 bits (Container CHOICE)	2 (= OCTET STRING)
							1 bit (octet string ext.)	0 (= no extension)
							7 bits (octet string length)	6
			EFC-ContextMark	contract Provider	10 bits (CountryCode)			See ISO 3166-1
					14 bits (IssuerIdentifier)			See ISO 14816
				typeOf Contract	16 bits			any
		context Version				1 bit (contextVersion ext.)	0 (= no extension)	
						7 bits	any	
	Application 2				1 bit (eid opt.)	0/1		
					1 bit (parameter opt.)	0/1		
		aid				1 bit (aid ext.)	0 (= no extension)	
						5 bits	See DSRCApplicationEntityID, [EN 12834] Annex A	
		eid				1 bit (eid ext.)	0 (= no extension)	
						7 bits	any (≠ other eid used in this VST)	
		parameter				See ApplicationContextMark, [EN 12834] Annex A		
		..				...	...	
	Application M				1 bit (eid opt.)	0/1		
					1 bit (parameter opt.)	0/1		
		aid				1 bit (aid ext.)	0 (= no extension)	
						5 bits	See DSRCApplicationEntityID, [EN 12834] Annex A	
		eid				1 bit (eid extension)	0 (= no extension)	
						7 bits	any (≠ other eid used in this VST)	

			Length	Allowed Values
		parameter		See ApplicationContextMark, [EN 12834] Annex A
obeConfiguration			1 bit (obeStatus opt.)	0/1
	equipmentClass		15 bits	any
	manufacturerID		16 bits	any
	obeStatus		16 bits	valid status

Table A.4 — VST, General Structure (security level 1)

					Length	Allowed Values
Fill					4 bits	Any
Profile					1 bit (Profile ext.)	0 (= no extension)
					7 bits	See Profile in EN 12834 Annex A
applications					1 bit (applications ext.)	0 (= no extension)
					7 bits (number of applic.)	M
	EFC Application				1 bit (eid opt.)	1 (= eid present)
					1 bit (parameter opt.)	1 (= parameter present)
		aid			1 bit (aid ext.)	0 (= no extension)
					5 bits	1 (= electronic-fee-collection)
		eid			1 bit (eid ext.)	0 (= no extension)
					7 bits	any (≠ other eid used in this VST)
		parameter	EFC-ContextMark		1 bit (Container ext.)	0 (= no extension)
					7 bits (Container CHOICE)	2 (= OCTET STRING)
					1 bit (octet string ext.)	0 (= no extension)
					7 bits (octet string length)	16
					10 bits (CountryCode)	See EN ISO 3166-1
					14 bits (IssuerIdentifier)	See EN ISO 14816
					16 bits	any
					1 bit (contextVersion ext.)	0 (= no extension)
					7 bits	any

				Length	Allowed Values	
				1 bit (Container ext.)	0 (= no extension)	
				7 bits (Container CHOICE)	2 (= OCTET STRING)	
				1 bit (octet string ext.)	0 (= no extension)	
				7 bits (octet string length)	2	
			AC_CR_Reference	AC_CR_Mas terKeyRef	8 bits	any
				AC_CR_Di versifier	8 bits	any
				1 bit (Container ext.)	0 (= no extension)	
				7 bits (Container CHOICE)	2 (= OCTET STRING)	
		1 bit (octet string ext.)		0 (= no extension)		
		7 bits (octet string length)		4		
		RndOBE		32 bits	any	
		Application 2		1 bit (eid opt.)	0/1	
				1 bit (parameter opt.)	0/1	
			aid	1 bit (aid ext.)	0 (= no extension)	
				5 bits	See DSRCAApplicationEntityID, EN 12834 Annex A	
			eid	1 bit (eid ext.)	0 (= no extension)	
				7 bits	any (≠ other eid used in this VST)	
	parameter			See ApplicationContextMark, EN 12834 Annex A		
	...			...	...	
	Application M			1 bit (eid opt.)	0/1	
				1 bit (parameter opt.)	0/1	
		aid	1 bit (aid ext.)	0 (= no extension)		
			5 bits	See DSRCAApplicationEntityID, EN 12834 Annex A		
		eid	1 bit (eid extension)	0 (= no extension)		
			7 bits	any (≠ other eid used in this VST)		

			Length	Allowed Values
		parameter		See ApplicationContextMark, EN 12834 Annex A
obeConfigur ation			1 bit (obeStatus opt.)	0/1
		equipmentClass	15 bits	any
		manufacturerID	16 bits	any
		obeStatus	16 bits	any

A.5.3 PDUs Parameters

A.5.3.1 Parameters of request PDUs (security level 0)

The following tables:

- Table A.5 — GET-Rq parameters (security level 0);
- Table A.6 — SET-Rq parameters (security level 0);
- Table A.7 — ACTION-Rq parameters (security level 0)

describe the valid format of the request APDUs for the security level 0.

Table A.5 — GET-Rq parameters (security level 0)

	EN 12834, Annex A	FprEN 15509:2022, B.4.5.5 Table B.16
GET-Rq	fill	=
	eid	
	accessCredentials OPTIONAL	prohibited
	iid OPTIONAL	
	attributeIdList OPTIONAL	mandatory

Table A.6 — SET-Rq parameters (security level 0)

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.18
SET-Rq	fill	=
	mode	
	eid	
	accessCredentials OPTIONAL	prohibited
	attrList	=
	iid OPTIONAL	prohibited

Table A.7 — ACTION-Rq parameters (security level 0)

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.20
ACTION-Rq	mode	=
	eid	
	actionType	
	accessCredentials OPTIONAL	prohibited
	actionParameter OPTIONAL	mandatory
	iid OPTIONAL	prohibited

Table A.8 — EVENT-REPORT-Rq parameters (security level 0)

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.22
EVENT-REPORT-Rq	mode	=
	Eid	
	eventType	
	accessCredentials OPTIONAL	prohibited
	eventParameter OPTIONAL	
	iid OPTIONAL	

A.5.3.2 Parameters of request PDUs (security level 1)

The following tables:

- Table A.9 — GET-Rq parameters (security level 1);
- Table A.10 — SET-Rq parameters (security level 1);
- Table A.11 — ACTION-Rq parameters (security level 1);
- Table A.12 — EVENT-REPORT-Rq parameters (security level 1)

describe the valid format of the request APDUs for the security level 1.

Table A.9 — GET-Rq parameters (security level 1)

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.16
GET-Rq	Fill	=
	Eid	
	accessCredentials OPTIONAL	mandatory
	iid OPTIONAL	prohibited
	attributeIdList OPTIONAL	mandatory

Table A.10 — SET-Rq parameters (security level 1)

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.18
SET-Rq	Fill	=
	mode	
	Eid	
	accessCredentials OPTIONAL	mandatory
	attrList	=
	iid OPTIONAL	prohibited

Table A.11 — ACTION-Rq parameters (security level 1)

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.20
ACTION-Rq	mode	=
	eid	
	actionType	
	accessCredentials OPTIONAL	mandatory
	actionParameter OPTIONAL	
	iid OPTIONAL	prohibited

Table A.12 — EVENT-REPORT-Rq parameters (security level 1)

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.22
EVENT-REPORT-Rq	mode	=
	eid	
	eventType	
	accessCredentials OPTIONAL	prohibited
	eventParameter OPTIONAL	
	iid OPTIONAL	

A.5.3.3 Parameters of response PDUs

The following tables:

- Table A.13 — GET-Rs parameters;
- Table A.14 — SET-Rs parameters;
- Table A.15 — ACTION-Rs parameters

describe the valid format of the response APDUs.

Table A.13 — GET-Rs parameters

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.17
GET-Rs	fill	=
	eid	
	iid OPTIONAL	prohibited
	attributelist OPTIONAL	mandatory
	ret OPTIONAL	

Table A.14 — SET-Rs parameters

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.19
SET-Rs	Fill	=
	Eid	
	Iid OPTIONAL	prohibited
	ret OPTIONAL	mandatory

Table A.15 — ACTION-Rs parameters

	EN 12834 Annex A	FprEN 15509:2022, B.4.5.5 Table B.21
ACTION-Rs	Fill	=
	Eid	
	lid OPTIONAL	prohibited
	responseParameter OPTIONAL	mandatory
	Ret OPTIONAL	

A.5.4 Application I-kernel test purposes for OBE, security level 0 (AP-OBAS)

A.5.4.1 Data Structures

These Test Purposes apply to the security level 0 claimed in FprEN 15509:2022 ICS proforma for OBE, B.4.3C.4.4, Table CB3.

For the purpose of this conformance test, the BSTs parameters described in Table A.16 — BST1: valid BST are transmitted to the IUT in the Test Purposes that follow. Invalid values are indicated in **boldface**.

Table A.16 — BST1: valid BST

			Length	Values
			1 bit (nonmandApplications opt.)	0 (= nonmandApplications not present)
rsu	manufacturerid		16 bits	registered value
	individualid		27 bits	any
time			32 bits	any
profile			1 bit (Profile ext.)	0 (= no extension)
			7 bits	0
mandApplications			1 bit (mandApplications ext.)	0 (= no extension)
			7 bits (number of applications)	1
	EFC Application		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	1 (= electronic-fee-collection)
profileList			1 bit (profileList ext.)	0 (= no extension)
			7 bits (number of profiles)	0 (= list empty)

A.5.4.2 BV test purposes

Test subgroup objective:

a) to test the behaviour of the IUT in relation to:

- 1) valid BST;
- 2) valid EVENT-REPORT-Rq (Release);

b) to test the IUT support of:

- 1) BeaconId;
- 2) Time;
- 3) Profile;
- 4) Applications;
- 5) LID.

TP/AP-OBAS/OBU/BV/01	Receive and manage INITIALISATION.request (BST)
TP Origin	Identical to TP/AL-I/OBU/BV/01 in ETSI/TS 102 486-2-2, 5.4.1
Reference	EN 15509, 6.1.4
Initial condition	See TP/AL-I/OBU/BV/01 in ETSI/TS 102 486-2-2, 5.4.1
Stimulus and Expected Behaviour See TP/AL-I/OBU/BV/01 in ETSI/TS 102 486-2-2, 5.4.1	

TP/AP-OBAS/OBU/BV/02	Receive and manage EVENT-REPORT.request (RELEASE) with mode = 0
TP Origin	Identical to TP/AL-I/OBU/BV/02 in ETSI/TS 102 486-2-2, 5.4.1
Reference	FprEN 15509:2022, 6.1.4
Initial condition	See TP/AL-I/OBU/BV/02 in ETSI/TS 102 486-2-2, 5.4.1
Stimulus and Expected Behaviour See TP/AL-I/OBU/BV/02 in ETSI/TS 102 486-2-2, 5.4.1	

TP/AP-OBAS/OBU/BV/03	Read and manage the BeaconID in the BST
TP Origin	Identical to TP/AL-I/OBU/BV/03 in ETSI/TS 102 486-2-2, 5.4.1
Reference	FprEN 15509:2022, 6.1.4
Initial condition	See TP/AL-I/OBU/BV/03 in ETSI/TS 102 486-2-2, 5.4.1
Stimulus and Expected Behaviour See TP/AL-I/OBU/BV/03 in ETSI/TS 102 486-2-2, 5.4.1	

TP/AP-OBAS/OBU/BV/04	Read and manage time of reception of BST in parameter Time in BST
TP Origin	Identical to TP/AL-I/OBU/BV/04 in ETSI/TS 102 486-2-2, 5.4.1
Reference	FprEN 15509:2022, 6.1.4
Initial condition	See TP/AL-I/OBU/BV/04 in ETSI/TS 102 486-2-2, 5.4.1
Stimulus and Expected Behaviour	
See TP/AL-I/OBU/BV/04 in ETSI/TS 102 486-2-2, 5.4.1	

TP/AP-OBAS/OBU/BV/05	Empty Test Purpose, left to keep numbering aligned with ETSI/TS 102 486-2-2
TP Origin	
Reference	
Initial condition	
Stimulus and Expected Behaviour	

TP/AP-OBAS/OBU/BV/06	Empty Test Purpose, left to keep numbering aligned with ETSI/TS 102 486-2-2
TP Origin	
Reference	
Initial condition	
Stimulus and Expected Behaviour	

TP/AP-OBAS/OBU/BV/07	Empty Test Purpose, left to keep numbering aligned with ETSI/TS 102 486-2-2
TP Origin	
Reference	
Initial condition	
Stimulus and Expected Behaviour	

TP/AP-OBAS/OBU/BV/08	Empty Test Purpose, left to keep numbering aligned with ETSI/TS 102 486-2-2
TP Origin	
Reference	
Initial condition	
Stimulus and Expected Behaviour	

TP/AP-OBAS/OBU/BV/09	Manage profile selection
TP Origin	Identical to TP/AL-I/OBU/BV/09 in ETSI/TS 102 486-2-2, 5.4.1
Reference	FprEN 15509:2022, 6.1.4
Initial condition	See TP/AL-I/OBU/BV/09 in ETSI/TS 102 486-2-2, 5.4.1
Stimulus and Expected Behaviour	
See TP/AL-I/OBU/BV/09 in ETSI/TS 102 486-2-2, 5.4.1	

TP/AP-OBAS/OBU/BV/10	Verify that the IUT replies to a BST with a VST												
TP Origin	Specific												
Reference	FprEN 15509:2022, 6.1.4												
Initial condition	IUT not in sleep mode and not yet initialized												
Stimulus and Expected Behaviour													
<table border="0"> <tr> <td>Tester</td> <td>IUT</td> </tr> <tr> <td>1BST1</td> <td>⇒</td> </tr> <tr> <td>2</td> <td>⇐ VST</td> </tr> <tr> <td>3</td> <td>Verify length and allowed values of VST (see Table A.3 — VST, General Structure)</td> </tr> <tr> <td>4</td> <td>IF verification performed in step 3 is NOT OK THEN</td> </tr> <tr> <td></td> <td>TP failed</td> </tr> </table>		Tester	IUT	1BST1	⇒	2	⇐ VST	3	Verify length and allowed values of VST (see Table A.3 — VST, General Structure)	4	IF verification performed in step 3 is NOT OK THEN		TP failed
Tester	IUT												
1BST1	⇒												
2	⇐ VST												
3	Verify length and allowed values of VST (see Table A.3 — VST, General Structure)												
4	IF verification performed in step 3 is NOT OK THEN												
	TP failed												

A.5.4.3 BI test purposes

Test subgroup objective:

- to check the behaviour of the IUT in response to invalid stimuli and behaviour from the test tool.

TP/AP-OBAS/OBU/BI/01	Manage profile selection
TP Origin	Identical to TP/AL-I/OBU/BI/01 in ETSI/TS 102 486-2-2, 5.4.2
Reference	FprEN 15509:2022, 6.1.4
Initial condition	See TP/AL-I/OBU/BI/01 in ETSI/TS 102 486-2-2, 5.4.2
Stimulus and Expected Behaviour	
See TP/AL-I/OBU/BI/01 in ETSI/TS 102 486-2-2, 5.4.2	

TP/AP-OBAS/OBU/BI/02	Manage applications
TP Origin	Identical to TP/AL-I/OBU/BI/02 in ETSI/TS 102 486-2-2, 5.4.2
Reference	FprEN 15509:2022, 6.1.4
Initial condition	See TP/AL-I/OBU/BI/02 in ETSI/TS 102 486-2-2, 5.4.2
Stimulus and Expected Behaviour	
See TP/AL-I/OBU/BI/02 in ETSI/TS 102 486-2-2, 5.4.2	

A.5.5 Application T-kernel test purposes for On-Board Unit, security level 0 (AP-0FUN)

A.5.5.1 General

These Test Purposes apply to the security level 0 claimed in FprEN 15509:2022 ICS proforma for OBU, B.4.3, Table B.3.

A.5.5.2 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.

TP/AP-0FUN/OBU/BV/01	Receive GET.request and manage GET.response with LID = private
TP Origin	Identical to TP/AL-T/OBU/BV/01 in ETSI/TS 102 486-2-2, 5.2.1
Reference	FprEN 15509:2022, 6.1.4
Initial condition	See TP/AL-T/OBU/BV/01 in ETSI/TS 102 486-2-2, 5.2.1
Stimulus and Expected Behaviour	
See TP/AL-T/OBU/BV/01 in ETSI/TS 102 486-2-2, 5.2.1 NOTE: Request without accessCredentials	