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Entwurf

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Elektronische Gebührenerhebung – Konformitätsbeurteilung von bordeigenen und straßenseitigen Ausrüstungen nach ISO 13141 – Teil 1: Struktur und Zweck des Prüfprogrammes (ISO/DIS 13140-1:2016); Englische Fassung prEN ISO 13140-1:2016

Electronic fee collection –
Evaluation of on-board and roadside equipment for conformity to ISO 13141 –
Part 1: Test suite structure and test purposes (ISO/DIS 13140-1:2016);
English version prEN ISO 13140-1:2016

Perception du télépéage –
Évaluation des équipements embarqués et en bord de route quant à la conformité avec l´ISO 13141 –
Partie 1: Structure de suite d´essai et buts des essais (ISO/DIS 13140-1:2016);
Version anglaise prEN ISO 13140-1:2016

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2016-01-15 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

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Nationales Vorwort

Dieses Dokument (prEN ISO 13140-1:2016) wurde vom technischen Komitee CEN/TC278 „Intelligente Verkehrssysteme“ ausgearbeitet, dessen Sekretariat vom NEN (Niederlande) gehalten wird in Verbindung mit dem technischen Komitee ISO/ TC204 'Intelligente Transportsysteme'.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-02-71 GA „Intelligente Verkehrssysteme“ des Normenausschusses Automobiltechnik.

Der Entwurf ist derzeit zur parallelen Umfrage vorgelegt.

Die EN ISO 17575 ist Teil einer Serie von Normen, welche Interoperabilität für autonome Gebührenerhebungssysteme (en: EFC-Systems) gewährleisten. Sie beinhaltet EFC-Inhaltsdaten, deren Änderungsvermerk sowie deren Nutzung der Kommunikationsinfrastruktur.

Diese Menge von Normen unterstützt außerdem dedizierte Nahbereichs Kommunikationsverbindungen im Zusammenhang von fahrzeuginternen Einrichtungen zur autonomen elektronischen Gebührenerhebung, um stichprobenhafte Prüfungen der exekutiven Behörden zu ermöglichen. Die Anwendungsschnittstelle ist dabei in ISO 13141:2015 festgelegt.

Dabei legt dieser Normenentwurf innerhalb der EFC-Standardisierung den Prozess und Prüfungen zur Konformitätsprüfung von fahrzeuginternen- sowie Straßenrandsystemen gemäß den Anforderungen in ISO 13141:2015 fest.

Die Norm dient deshalb EFC-Systemherstellern zur Qualitätsprüfung ihrer Systeme und somit der Sicherstellung interoperabler Mautsysteme.

Änderungen

Gegenüber DIN CEN ISO/TS 13140-1 (DIN SPEC 91230):2011-09 wurden folgende Änderungen vorgenommen:

a) Überführung in eine europäische Norm,

b) Ergänzung von Begriffen, bzw. Harmonisierung von Begriffen im Umfeld der Standardisierung im Bereich Elektronische Gebührenerhebung,

c) Ergänzungen aufgrund von Anpassungen in untergeordneten Normen, speziell DIN EN ISO 13141, und DIN EN ISO 14906,

d) Editorische und formelle Anpassungen.

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Nationaler Anhang NA
(informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

3.1
Zugriffsbeglaubigung
(en: access credentials)
vertrauenswürdige Bescheinigung oder sicheres Modul, welches die geforderte Identität eines Objektes oder einer Anwendung beansprucht

[Quelle: EN 15509:2014, 3.1]

ANMERKUNG Zugriffbeglaubigungen transportieren Informationen, welche die Zugriffsbedingungen regeln um entsprechend an die OBE adressierte Operationen durchführen zu können. Diese Zugriffbeglaubigungen können sowohl Passwörter als auch kryptografische Informationen wie Authentifikatoren enthalten.

3.2
Attribut
(en: attribute)
adressierbare Datenpaket, welches aus einem einzelnen Datenelement oder strukturierten Sequenzen von Datenelementen besteht

[Quelle: ISO/FDIS 17575-1:2015, 3.2]

3.3
Authentifizierung
(en: authenticaton)
Vorkehrung einer Zusicherung, dass eine beanspruchte Charakteristik einer Einrichtung korrekt ist

[Quelle: ISO/IEC 27000:2014, 2.7]

3.4
Authentifikator
(en: authenticator)
möglicherweise verschlüsselte Daten, die zur Authentifizierung verwendet werden

[Quelle: EN 15509:2014, 3.3]

3.5
Vertrag
(en: contract)
Ausdruck einer Übereinkunft zwischen zwei oder mehreren Verhandlungspartnern zur Nutzung der Straßen Infrastruktur

[Quelle: ISO 14906:2011, 3.7]

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3.6
Kryptografie
(en: cryptography)
Prinzipien, Absichten und Methoden zur Datentransformation umfasst um den Dateninhalt zu verstecken bzw. unentdeckte Veränderungen oder unautorisierte Nutzung zu verhindern

[Quelle: EN 15509:2014, 3.6]

3.7
Datengruppe
(en: data group)
Klasse zusammenhängender Attribute

[Quelle: ISO/FDIS 17575:2015]

3.8
Element
(en: element)
DRSC-Verzeichnis, welches Anwendungsinformation in Form von Attributen beinhaltet

[Quelle: ISO 14906:2011, 3.11 modifiziert]

3.9
Implementierungskonformitätsaussage
(en: implementation conformance statement)
Aussage bezogen auf die implementierte Leistungsfähigkeit und Optionen die festlegt, in welchem Ausmaß die Implementierung zu einer gegebenen Spezifikation konform ist

[Quelle: ISO/TS 14907:2011, 3.10 modifiziert]

3.10
Implementierungszusatzinformation für Prüfungen
(en: implementation extra information for testing)
Aussage, bezogen auf die zu prüfende Implementierung (en: IUT) und dessen korrespondierendes zu prüfende System (en: SUT), die alle Informationen beinhaltet die das Prüflabor befähigt, die entsprechende Testreihe gegen die IUT durchzuführen

[Quelle: ISO/IEC 19015:2000, 3.20, modifiziert]

3.11
fahrzeuginterne Einrichtung
OBE
(en: on-board equipment)
alle erforderlichen Einrichtungen im Fahrzeug, die zur Durchführung notwendiger Kommunikationsdienste, wie OBU, Kabel, Stromversorgung und externe Antenne, benötigt werden

3.12
fahrzeuginterne Einheit
OBU
(en: on-board unit)
kleinste Komponente einer fahrzeuginternen Einrichtung, welche mindestens die DSRC-Schnittstelle beinhaltet

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3.13
Straßenrand-Einrichtung
RSE
(en: roadside equipment)
feste oder mobile Einrichtung entlang einer Straße

3.12
Prüfgerät
(en: tester)
Kombination von Gerät, Personen und Prozessen um spezifische Konformitätsprüfungen durchführen zu können

[Quelle: EN 15876-1, 3.12]

3.13
Vorgang
(en: transaction)
Gesamtheit eines Informationsaustauschs zwischen zwei physikalisch getrennten Kommunikationseinrichtungen

[Quelle: ISO/FDIS 17575:2015, 3.21]

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Foreword

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

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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

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

The committee responsible for this document is ISO/TC204

This second edition replaces the first edition ISO/TS 13140-1:2011, which has been technically revised. This second edition incorporates the following main modifications compared to the Technical Specification:

— conversion from a Technical Specification to an International Standard;

— amendment of terms, in order to reflect harmonization of terms across electronic fee collection (EFC) standards;

— amendments to reflect changes to the underlying base standards, in particular ISO 13141 and ISO 14906;

— editorial and formal corrections.

ISO 13140 consists of the following parts, under the general title *Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to ISO 13141*:

— *Part 1: Test suite structure and test purposes*

— *Part 2: Abstract test suite*

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Introduction

ISO 17575 is part of a set of standards that supports interoperability of autonomous EFC-systems. It defines the EFC context data, their charge reports and their use of communication infrastructure.

The set of standards also supports short-range communication links in the context of autonomous electronic fee collection (EFC) on-board equipment (OBE) to enable localisation augmentation process. The application interface is defined in ISO 13141:2015.

Within the set of EFC standards this part of ISO 13140 defines the process and tests for conformity evaluation of OBE and roadside equipment (RSE) that comply with the requirements in ISO 13141:2015.

This part of ISO 13140 is intended to

— assess OBU and RSE capabilities,

— assess OBU and RSE behaviour,

— serve as a guide for OBU 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 communications between parties.

This part of ISO 13140 is based on

— ISO 13141:2015,

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

— ISO 9646.

This part of ISO 13140 is based on using the tree and tabular combined notation (TTCN) that is a standardized language suitable for specification of test cases and steps for assessment of protocol and application behaviour. The TTCN language is also supported by modern automated tools that accelerate software design, implementation and testing.

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Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to ISO 13141 — Part 1: Test suite structure and test purposes

1 Scope

This part of ISO 13140 specifies the test suite structure (TSS) and test purposes (TP) to evaluate the conformity of on-board units (OBU) and roadside equipment (RSE) to ISO 13141:2015.

It provides a basis for conformance tests for dedicated short-range communication (DSRC) equipment (on-board units and roadside units) to enable interoperability between different equipment supplied by different manufacturers.

2 Normative references

The following referenced documents are indispensable for the application 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 13141:2015, *Electronic fee collection — Localisation augmentation communication for autonomous systems*

ISO 14906:2011/Amd 1:2015, *Electronic fee collection — Application interface definition for dedicated short-range communications*

ISO/TS 14907-2:2015, *Road transport and traffic telematics — Electronic fee collection — Test procedures for user and fixed equipment — Part 2: Conformance test for the onboard unit application interface*

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

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

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

[1] To be published.

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3 Terms and definitions

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

3.1
access credentials
trusted attestation or secure module that establishes the claimed identity of an object or application property that ensures that the actions of an entity may be traced uniquely to that entity

[SOURCE: EN 15509:2014, 3.1]

NOTE Access credentials carry information needed to fulfil access conditions in order to perform the operation on the addressed element in the OBE. Access credentials can carry passwords as well as cryptography-based information such as authenticators.

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

[SOURCE: ISO/FDIS 17575-1:2015, 3.2]

3.3
authentication
provision of assurance that a claimed characteristic of an entity is correct

[SOURCE: ISO/IEC 27000:2014, 2.7]

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

[SOURCE: EN 15509, 3.3]

3.5
contract
expression of an agreement between two or more parties concerning the use of the road infrastructure

[SOURCE: ISO 14906:2011, 3.7]

3.6
cryptography
principles, means and methods for the transformation of data in order to hide its information content, prevent its undetected modification or prevent its unauthorised use

[SOURCE: EN 15509:2014, 3.6]

3.7
data group
class of closely related attributes

[SOURCE: ISO/FDIS 17575-1:2015, 3.10]

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3.8
Element
DSRC directory containing application information in the form of attributes

[SOURCE: ISO 14906:2011, 3.11 modified]

3.9
implementation conformance statement
statement made by the supplier of an implementation or system claimed to conform to a given specification, providing detailed information on which capabilities have been implemented, and stating whether the product or service is conformant or not

[SOURCE: ISO/TS 14907-2:2011, 3.10 modified]

3.10
implementation extra information for testing
statement containing all of the information related to the implementation under test (IUT) and its corresponding system under test (SUT) which will enable the testing laboratory to run an appropriate test suite against that IUT

[SOURCE: ISO/IEC 19015:2000, 3.20 modified]

3.11
on-board equipment
OBE
all required equipment on-board a vehicle for performing required communication services, such as OBU, cabling, power supply and external antenna

3.12
on-board unit
OBU
single electronic unit on-board a vehicle, usually fixed inside the windscreen, for communication with external systems

3.13
roadside equipment
RSE
equipment located along the road, either fixed or mobile

3.14
tester
combination of equipment, humans and processes able to perform specified conformance tests

[SOURCE: EN 15876-1, 3.12]

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

[SOURCE: ISO/FDIS 17575-1:2015, 3.21]

4 Abbreviated terms

AC_CR Access Credentials

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

5 Test suite structure (TSS)

5.1 Structure

The Test Suite Structure (TSS) including its subgroups that are inherited from other specifications is given in Table 1.

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Table 1 — Test Suite Structure

Group	Type of DUT	Behaviour
Physical layer	On-Board Unit	Valid Behaviour
		Invalid Behaviour
	Roadside Equipment	Valid Behaviour
		Invalid Behaviour
DLC MAC sublayer	On-Board Unit	Valid Behaviour
		Invalid Behaviour
	Roadside Equipment	Valid Behaviour
		Invalid Behaviour
DLC LLC sublayer	On-Board Unit	Valid Behaviour
		Invalid Behaviour
	Roadside Equipment	Valid Behaviour
		Invalid Behaviour
Application layer	On-Board Unit	Valid Behaviour
		Invalid Behaviour
	Roadside Equipment	Valid Behaviour
		Invalid Behaviour

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

5.2 Reference to conformance test specifications

Conformance to a profile standard implies conformance to the related base standards; hence, a number of test cases for the LAC application 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 LAC application are identified for statements contained in the LAC application, which have no equivalence in the base standards. These latter cases cover for example the application layer data test purposes. This document takes into account already defined test purposes for conformance to the base standards by referencing them, so that:

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

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

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

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

5.3 Test Purposes (TP)

5.3.1 TP Definition conventions

The TPs are defined following the rules shown in Table 2 below. All Test Purposes are defined in Annex A and Annex B.

Table 2 — TP Definition Rules

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

TP ID	The TP ID is a unique identifier. It 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, paragraph), or the reference to the standard document defining the TP.
TP origin	Indicates if the TP is **identical** to a TP defined in another test standard, **derived** from a TP defined in another test standard, or **specific** for this standard profile.
Initial condition	The condition defines in which initial state the DUT 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 DUT to conform to the base specification.

5.3.2 TP naming conventions

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

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

TP : to indicate that it is a Test Purpose;

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

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

X : type of testing (i.e. Valid Behaviour tests – BV, or Invalid Behaviour tests – BI)

<nn> : sequential TP number (01-99)

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The naming conventions are as described in Table 3.

Table 3 — TP naming convention

Identifier: TP/<group>/<dut>/<x>-<nn>		
<group>		
applicable for OBU/RSE	PHY	Physical layer
applicable for OBU/RSE	MAC/LLC	MAC/LLC sublayer
applicable for OBU/RSE	AP-BAS	Application layer – I Kernel support
applicable for OBU	AP-FUN	Application layer – T Kernel support
applicable for OBU	AP-DAT	Application layer – Data attributes support
applicable for OBU	AP-SEC	Application layer – Security Level 1 support
applicable for RSE	AP-SET	Application layer - SET-rq PDU test purposes,
applicable for RSE	AP-REL	Application layer - EVENT-REPORT-rq PDU test purposes
<dut> = type of DUT	OBU	On-Board Unit
	RSE	Roadside Equipment
x = Type of testing	BV	Valid Behaviour Tests
	BI	Invalid Behaviour Tests
<nn> = sequential number	(01-99)	Test Purpose Number

5.4 Conformance test report

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

The manufacturer of the OBU shall complete the proforma conformance test report for on-board units as defined in Annex C.

The manufacturer of the RSE shall complete the proforma conformance test report for roadside equipment as defined in Annex D.

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Annex A
(normative)

Test purposes for on-board units

A.1 Introduction

This annex contains the Test Purposes (TP) for the conformity evaluation of OBUs to ISO 13141:2015.

A.1.1 Symbols in TP Descriptions

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

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 ⇒	The Tester sends the XXX.rq PDU to the 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 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 → B	Object A “is transformed” into Object B. So a notation like “Table X → 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.
Ø	Means “empty” or “not set”. So, a notation like “accessCredentials = Ø → 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.

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