SLOVENSKI STANDARD
SIST ENV ISO 14907-1:2003

01-oktober-2003

Cestna transportna in prometna telematika – Elektronsko pobiranje pristojbin – Postopki za preskušanje opreme – 1. del: Opis preskuševalnih postopkov (ISO/TR 14907-1:2000)

Road Transport and Traffic Telematics (RTTT) - Electronic Fee Collection (EFC) - Test procedures for user and fixed equipment - Part 1: Description of test procedures (ISO/TR 14907-1:2000)

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03.220.20	Cestni transport	Road transport
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English version

Road Transport and Traffic Telematics (RTTT) - Electronic Fee Collection (EFC) - Test procedures for user and fixed equipment - Part 1: Description of test procedures (ISO/TR 14907-1:2000)

This European Prestandard (ENV) was approved by CEN on 2 October 1999 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

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

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Foreword

This European Prestandard has been prepared by Technical Committee CEN/TC 278 "Road transport and traffic telematics", the secretariat of which is held by NNI, in collaboration with Technical Committee ISO/TC 204 "Transport information and control systems".

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This European Prestandard comprises the following parts, under the general title "Road Transport and Traffic Telematics (RTTT) - Electronic Fee Collection (EFC) - Test Procedures for User and Fixed Equipment":

- Part 1: Description of test procedures
- Part 2: Application interface conformance test specifications

Introduction

For an EFC system, approvals and tests are required to determine whether the system (or individual modules of the system) conforms to standards and application requirements, and to enable parameters, such as quality, availability and maintainability, to be measured.

There are complete EFC systems including documentation and approvals available which are possibly in operation in some countries of Europe. This European Pre-Standard provides a toolbox of tests and procedures for the assessment and proof of such EFC systems that they are suitable for specified EFC applications under specific operational conditions. Dependent on a system to be tested and based on the available documentation and the status of already carried out approvals this European Pre-Standard enables parties involved e.g. system provider, operators and test houses to take into consideration already proven references and to identify such parameters which still have to be tested according to the specified applications.

At the time of drafting this Pre-Standard, the determination of common system requirements for Europe (or any other region) has not been agreed. This Pre-Standard therefore does not specify any particular performance requirements unless these are already determined elsewhere (such as safety or radio regulations) but rather identifies the key parameters which will comprise such requirements. Where reference to an existing test is available, this Pre-Standard provides that reference. This Pre-Standard defines only the test and test procedures, not the benchmark figures that these are to be measured against. This European Pre-Standard is Part 1 of a series of standards. This part 1 describes the test procedures. Part 2 describes EFC application conformance tests. Future Pre-Standards will provide the benchmark figures to which the systems or components under test must be compared and validated.

This Pre-Standard is furthermore limited to automated (electronic) payment using a standardised dedicated short-range communication (DSRC). The scope of this Pre-Standard does not include manual payment, conventional money transaction, nor does it include payment by means of sticker, vignettes, tickets, or magnetic stripe cards etc. The applications to which EFC is related are Toll Collection, Road Pricing, Parking and Individual Traffic Information.

This is an enabling Pre-Standard to enable groups of operators to determine common specific performance levels and operating conditions, and to enable regional variation where appropriate. It provides operating and environmental parameters (or classes of operating and environmental parameters) within which such systems shall successfully function without impairing interoperability to ensure that the person specified the system can state his requirements clearly to implementation designers and integrators, and to enable the measurement of the performance of such systems.

The following guidelines have been followed when selecting the test procedures for test parameters:

- reference as far as possible to existing standardised test procedures;
- concentrate on those tests which are essential to ensure that EFC equipment is able to exchange information and mutually use the exchanged information.

A brief guide describing how to use this Pre-Standard is provided by Annex A of this Pre-Standard.

Whilst the scope of this Pre-Standard is generic, certain provisions relate specifically to 'test procedures' for CEN-certification purposes. Some or all of the features of this Pre-Standard are relevant internationally and this Pre-Standard therefore has relevance and is pursued as an ISO Technical Report Type 2. However, it is recognised that due to different regulatory requirements outside Europe, extension will be required to make the Pre-Standard as comprehensive in non CEN countries, before this Pre-Standard can be submitted for acceptance as a full international standard.

1 Scope

This European Pre-Standard specifies the test procedures of EFC road-side equipment (RSE) and on-board equipment (OBE) with regard to the conformance to standards and requirements for type approval and acceptance testing which is within the realm of EFC application specifically.

The scope of this Pre-Standard is restricted to systems operating within the radio emission, EMC regulations, traffic and other regulations of the countries in which they are operated and it is therefore a requirement that all required equipment approvals from an authenticated and accredited test house have been obtained in order to claim compliance.

The Pre-Standard identifies a set of suitable parameter and provides test procedures to enable the proof of a complete EFC system as well as components of a EFC system e. g. OBE related to the defined requirements of an application. The defined parameter and tests are assigned to the following groups of parameter:

- Functionality;
- Quality;
- Referenced pre-tests.

An overview of the tests and parameters provided by this Pre-Standard is given in clauses 5.1 and 5.2. Testing against ENV ISO 14906 (EFC functions and attributes) is covered by Part 2 of this Pre-standard.

The Pre-Standard describes procedures, methods and tools and a test plan which enables to show the relation between all tests and the sequence of these tests. It lists all tests which are required to measure the performance of EFC equipment. The Pre-Standard describes which EFC-equipment is covered by the test procedures, the values of the parameters to be tested are not included. It describes also how the tests are to be performed and which tools and pre-requisites are necessary before this series of tests are undertaken. It is assumed that the security of the system is inherent in the communications and EFC functionality tests and are thus not addressed specifically here. All tests in this Pre-Standard provide instructions to evaluate the test results.

The test procedures can be used for prototype testing, type approvals, test of installations and periodic inspections. Thus this Part 1 is a European Pre-Standard that defines only the test and test procedures, not the benchmark figures that these are to be measured against.

Related to a conceptual model of an EFC system this Pre-Standard relates only to the equipment of the user and the service provider as illustrated in figure 1. Any other entities are outside the scope of this Pre-Standard.

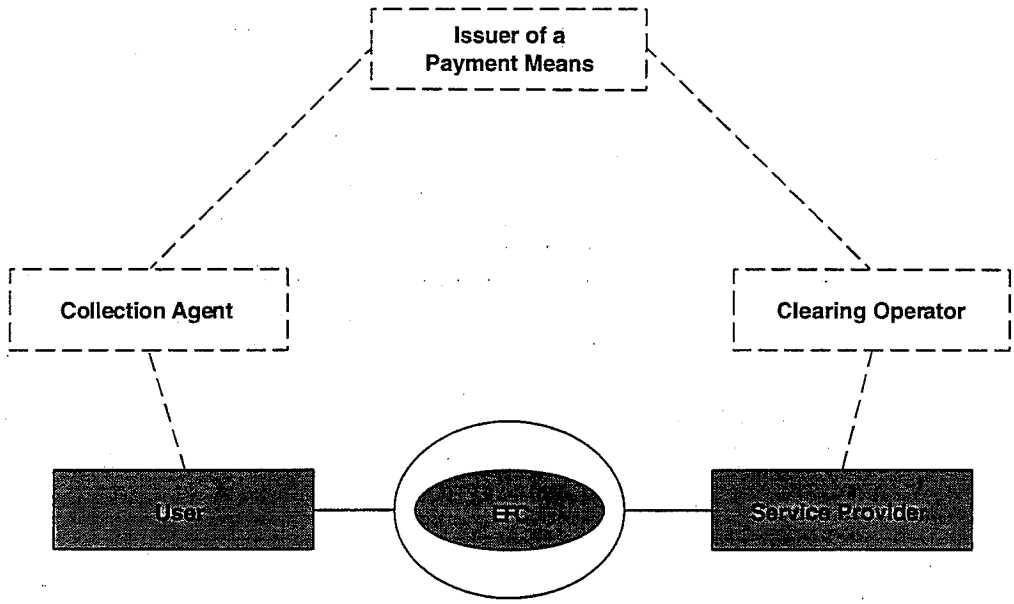

Figure 1: Conceptual Model of EFC

EFC systems for DSRC consist, in principle, of a group of technical components, which in combination fulfil the functions required for the collection of fees by electronic automatic means. These components comprise all or most of the following:

- on-board equipment (OBE) within a vehicle;
- on-board unit containing the communications and computing sub-functions;
- optional integrated circuit card which may carry electronic money, service rights and other secured information;
- communication between OBE and RSE based on DSRC;
- equipment for the fee collection at the road-side (RSE) containing the communications and computing sub-functions;
- equipment for the enforcement at the road-side;
- central equipment for the administration and operation of the system.

The scope of this Pre-Standard relates solely to OBE and RSE and the DSRC interface between OBE and RSE including its functions to perform the fee collection as illustrated by figure 2. All the equipment used for enforcement (e.g. detection, classification, localisation and registration) and central equipment are outside the scope of this Pre-Standard.

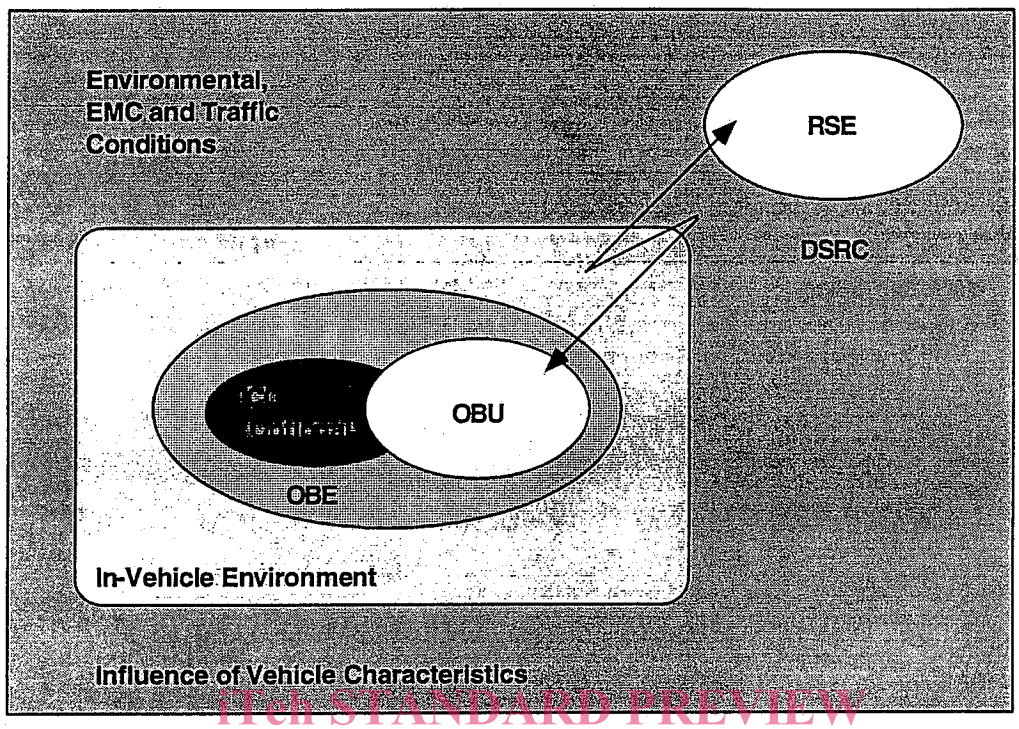

Figure 2: OBE/RSE Interface and Associated Environments

2 Normative references

This European Pre-Standard incorporates by dated or undated reference, provisions from other publications.

These normative references are cited at the appropriate places in the text and the publications are listed hereafter.

For dated references, subsequent amendments to, or revisions of, any of these publications apply to this European Pre-Standard only when incorporated in it by amendment of revision. For undated references the latest edition of the publication apply.

EN 45001	General criteria for the operation of testing laboratories
EN 45011	General criteria for certification bodies operating product certification
ENV ISO 14906	Road Transport and Traffic Telematics - Electronic Fee Collection - Application interface for dedicated short range communication (ISO/TR 14906:1998)
ISO 9000-1	Quality management and quality assurance standards - Part 1: Guidelines for selection and use
ISO 9001	Quality systems - Model for quality assurance in design/ development, production, installation and servicing
ISO 9002	Quality systems - Model for quality assurance in production, installation and servicing
ISO 9003	Quality systems - Model for quality assurance in final inspection and test
ISO 9004-1	Quality management and quality system elements - Part 1: Guidelines

3 Definitions

For the purpose of the European Pre-Standard, the following definitions apply:

3.1 acceptance testing Examination that a duly identified product, process or service is in conformity with the system specification.

3.2 EFC equipment EFC Equipment consists of Roadside Equipment (RSE) and On-Board Equipment (OBE).

3.3 EFC system A system that enables electronic debiting, i.e. paying for a transport service, without any action from the user at the moment of the use of the service.

3.4 availability Probability that a unit at a random point in time within a given interval is in least a certain degree of preparedness to function or functioning under given running, environmental and maintenance conditions.

3.5 certification Action by a third party, demonstrating that adequate confidence is provided that a duly identified product, process or service is in conformity with a specific standard or other normative document.

3.6 compatibility Suitability of products, processes or services for use together under specific conditions to fulfil relevant requirements without causing unacceptable interactions.

3.7 evaluation A procedure to assess a system or a unit by one or more type of tests to comply with the specified requirements.

3.8 field tests Tests which are performed under real life conditions.

3.9 functionality Group of parameter which are able to measure the performance of an EFC system, e.g. communication, application, vehicle and traffic characteristics.

3.10 inspection Procedure for determination and evaluation of the actual state of a system or unit.

3.11 interoperability Interoperability is the ability of systems to provide services to and accept services from other systems and to use the services so exchanged to enable them to operate effectively together.

3.12 laboratory tests Tests which are performed in a laboratory under specified conditions.

3.13 maintainability Ability of a device to be maintained or restore to specified conditions within a given period of time.

3.14 on-board equipment Equipment located within the vehicle and supporting the information exchange across the interfaces of its sub-units. It is composed of the On-Board Unit and other sub-units whose presence has to be considered optional for the execution of the DSRC interface.

3.15 quality All of the features and characteristics of the capability of a product or service to satisfy the requirements of the users (easiness of use, safety, availability, reliability, sturdiness, economy, environmental safety) whether given explicitly or implicitly.

3.16	**quality of EFC equipment**	Group of parameter (reliability, availability, maintainability) which are able to define the quality of EFC equipment by qualitative and quantitative figures.
3.17	**reliability**	Ability of a device to perform its intended function under given conditions of use for a specified period of time.
3.18	**roadside equipment**	Equipment located at a fixed position along the road transport network, allowing for the communication and data exchange with the On-Board Equipment.
3.19	**simulation**	Simulation is the representation of selected behavioural characteristics of one physical or abstract system by another system. [ISO 2382-1]
3.20	**simulation of an EFC system**	In a simulation of an DSRC-based EFC system, selected behavioural characteristics of the EFC system are represented by a computer model to enable the testing of the EFC equipment in a realistically modelled environment.
3.21	**test**	Technical operation that consists of the determination of one or more characteristics of a given product, process or device according to a specified procedure.
3.22	**test parameter**	One or more test parameter which are able to specify one or more performance criteria of an EFC system.
3.23	**test procedure**	Specific procedure for performing a test.
3.24	**test status**	Indication of the nature of a test. Conditional: A test labelled 'conditional' shall be subject to testing if and only if it is a feature of the system or component according to the specification. Basic: A test labelled 'basic' indicates a highly recommended test as part of a foundation for meaningful evaluation.
3.25	**test type**	A kind of test, e.g. inspection, simulation, lab-test and field test
3.26	**test house**	Recognised independent party which is competent to carry out specific tests or specific type of tests.
3.27	**type approval**	Examination by an accredited test house that a duly identified product, process or service is in conformity with a specific standard or other normative and referenced documents.
3.28	**validation**	Process of demonstration by one or more type of tests that a system satisfies its requirements.
3.29	**verification**	A process determining that a product of each phase of the system life cycle development process fulfils all the requirements specified in the previous phase.

4 Abbreviations

ASP	Abstract Service Primitive
DSRC	Dedicated Short Range Communication
EFC	Electronic Fee Collection
EMC	Electromagnetic Compatibility
HDLC	High Level Data Link Control
ICC	Integrated Circuit Card
IEC	International Electrotechnical Committee
ITSEC	Information Technology Security Evaluation Criteria
IUT	Implementation Under Test
MMI	Man Machine Interface
OBE	On Board Equipment
OBU	On Board Unit
PCO	Point of Control and Observation
PDU	Protocol Data Unit
PER	Packed Encoding Rules
RSE	Road Side Equipment
SUT	System Under Test
SAP	Service Access Point
TTCN	Tree and Tabular Combined Notation
VASCO	Validation of Dedicated Short-range Communication

5 Test parameters and test procedures for EFC

5.1 Tests overview

5.1.1 Introduction

The test parameters for EFC systems or components are categorised in three groups as follows:

- Functionality Tests;
- Quality Tests;
- Referenced Pre-Tests.

Figure 3 shows the general structure of all test parameter groups relevant for EFC systems and those which are relevant to this European Pre-Standard. The test parameters of the already mentioned pre-tests are referenced from sources other than this Pre-Standard. The specific test parameters which are ultimately deemed relevant for a specific EFC system shall be identified and listed in the test plan according to clause 5.3. The individual test plan for type approval or acceptance testing shall take into account the already passed tests of the pre-tests, e.g. for EMC, DSRC and environment.

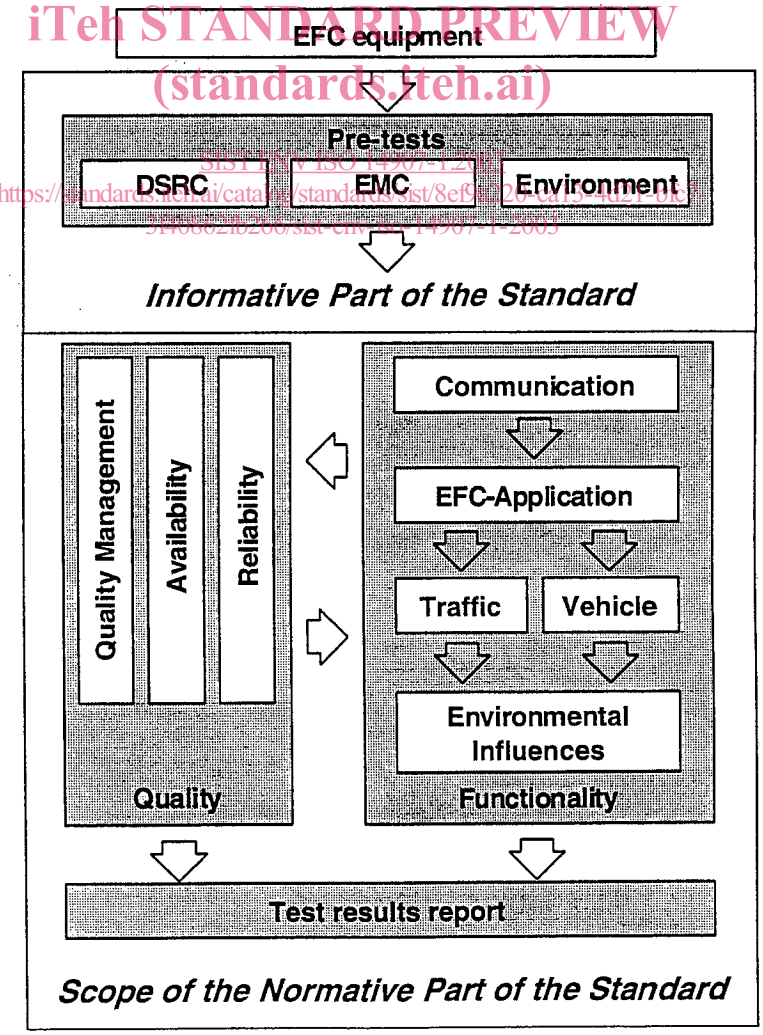

Figure 3: Test Plan - interdependencies