

# EasyGo+ OBE compatibility tests

## Enclosure E to Document 202 “Roadside and on board equipment”

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## Table of contents

DOCUMENT REVISION HISTORY .....	3
DEFINITIONS AND ABBREVIATIONS .....	4
1 INTRODUCTION .....	5
2 GENERAL TEST REQUIREMENTS .....	6
3 FUNCTIONAL OBE TESTS .....	7
3.1 OBJECTIVES .....	7
3.2 LABORATORY TEST CASES.....	7
3.3 TEST CASES PERFORMED AT THE TEST SITE .....	12
4 OBE SYSTEM COMPATIBILITY TESTS.....	17
4.1 OBJECTIVES AND OVERVIEW .....	17
4.2 TEST CASES PERFORMED AT THE TEST SITE .....	17
4.3 ON-ROAD TEST CASES .....	19
5 ANNEX A – OBE PERSONALIZATION DATA .....	21

## Document revision history

Version	Date	Author	Main changes
0.1	20.11.2012	HHA	First draft
0.2	03.01.2013	HHA	Version for comments
1.0	02.05.2013		Approved by steering committee

## Definitions and abbreviations

Abbreviation	Definition
BCH1210	Single Lane Beacon (wide beam, Supplier: KTC)
BCH1220	Multilane Free Flow beacon (Supplier: KTC)
BCH1310	Single Lane Beacon (narrow beam, Supplier: KTC)
DSRC	Dedicated Short Range Communication
EETS	European Electronic Tolling System
EFC	Electronic Fee Collection
EP	EETS Toll Service Provider
EMAS	DSRC Tolling equipment for barrier systems (Supplier: KTC)
MAS	Multilane Free Flow tolling station (Supplier: KTC)
MKE	Mobile enforcement equipment (Supplier: KTC)
OBE	On Board Equipment
PKE	Portable enforcement equipment for MAS upgrade (Supplier: KTC)
PMAS	Portable Free Flow tolling station (Supplier: KTC)
RSCS	Beacon controller for Free Flow tolling station (Supplier: KTC)
RSE	Road Side Equipment
SFU	Suitability for use
SKE	Fixed enforcement equipment for MAS upgrade (Supplier: KTC)
SKE S&G	Fixed enforcement station for Stop&Go traffic situations (Supplier: KTC-AB)
SLA	Service Level Agreement
SU	Service User
TRC	Beacon controller for Free Flow tolling station (Supplier: KTC)
TC	Toll Charger
TRX1220	Multilane Free Flow beacon (Supplier: KTC)
TSP	Toll Service Provider

## 1 Introduction

This document defines the tests cases to be carried out successfully for OBE in order to be allowed to operate within the EasyGo+ DSRC Toll domains.

For EasyGo+, DSRC according to EN 15509 is used.

The test cases are covering the Toll Chargers requirements in all EasyGo+ DSRC Toll domains, both Multi Lane Free Flow- as well barrier systems.

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## 2 General test requirements

The EasyGo+ OBE compatibility tests shall be performed in cooperation between the EasyGo+ Toll Chargers and the Toll Service Provider (OBE issuer). The Toll Service Provider may appoint and authorize a test institute or a Notified Body or suppliers to perform the test together with EasyGo+ Toll Chargers.

It can be agreed to carry out the functional OBE tests according to chapter 3 and 4 for a particular OBE model with a defined hard- and software version together with the manufacturer independently of a specific Toll Service Provider to prequalify this OBE for acceptance as EasyGo+ OBE.

Please note that in addition to the already passed functional OBE tests each Toll Service Provider is obliged to carry out further Suitability For Use Tests according to EasyGo document 908 (Specification for EETS Suitability For Use Tests within EasyGo).

All test results shall be fully documented in a test report, containing identification of the tested OBE, test set-up, test equipment, test vectors and test results – ensuring traceability and allowing reproducibility.

### Test Contracts:

For the compatibility tests the used EFC Context Mark shall differ from the one used later on during pilot and operational phase.

Note 1: The numbering of the test cases in the following sections is in accordance with the historic test definitions.

### Test report constituents:

The list below defines the information that shall be delivered as a report for each test case:

- test name
- test number
- run number and total number of test runs
- hardware version of tested OBE
- software version of tested OBE
- test location, versions and/or identification of used RSE test equipment
- description of test run (if appropriate including special observations)
- test result description (including test passed/not passed)
- test date and test duration (e.g. start and end time)
- name of the responsible tester
- reference to test log files or supplementary test documentation if available

### 3 Functional OBE tests

All tests shall be performed at least with an OBE contingent from pilot-run series, which are manufactured on mass production conditions. The sample size shall be sufficient to proof the corresponding requirement and acceptance criteria. At least five samples of OBE shall be subject to testing.

Precondition for starting the functional OBE tests is the accepted conformity declaration for this OBE.

#### 3.1 Objectives

The main objectives of the functional OBE tests are:

- Verification of the OBE functionality in interaction with beacons under laboratory conditions.
- Validation of the transaction reliability of the OBE.
- Guarantee the OBE functionality in interaction with the road side equipment in a sufficiently large communication zone.
- Verification of the EasyGo+ MMI requirements for the OBE.
- Verification of the OBE interaction with the road side and enforcement equipment.
- Verification of the OBE functionality together with a reference OBE being at the same time in the RSE communication zone.

#### 3.2 Laboratory test cases

All test cases in this chapter are performed under laboratory conditions.

<i>Test name:</i>	<b>Basic transaction – stand alone beacon</b>	<i>No.:</i> <b>1.0.5</b>
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*Purpose:* Verification of the OBE personalization and functionality in interaction with road side equipment

*Equipment:* Stand-alone beacon application

*Description:* Several transactions shall be performed with OBEs with different personalization data (detailed test data specification see chapter 5:

- Vehicle category (e.g. 2, 3 or 4+ axles) and license plate numbers
- European vehicle class (e.g. HGV up to and over 12t, large passenger vehicles)
- Expiry date after current date

To evaluate the test target, a second transaction is performed with each OBE to read-out the attribute ReceiptData1 written in the previous transaction.

Checking of the acoustic signal of the OBE; checking of the toll transaction record.

*Intention:* Performing of valid transactions: depending on the values presented by the OBE the tariff can be correctly calculated.

The received data is according to the defined personalization data of the OBE.

The value of Receiptdata1 written by the RSE is correctly stored and can be correctly read-out.

Check the MMI beep signaling for "transaction OK".

<i>Test name:</i>	<b>Transaction – expiry date near</b>	<i>No.:</i> <b>1.1.3</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Stand-alone beacon with EFC application

*Description:* Tolling transaction of an OBE with an expiry date that is reached in less than two months: the data element PaymentMeans.ExpiryDate has a date value which will be reached in less than 62 days.

Checking of the acoustic signal of the OBE; checking of the toll transaction record.

*Intention:* Signaling of near expiry date by the OBE (OBE expires within 62 days) with two beeps.

Correct OBE data presented by the OBE and collected in the toll transaction record.

<i>Test name:</i>	<b>Transaction – contract expired</b>	<i>No.:</i> <b>1.1.5</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Stand-alone Beacon with EFC Application

*Description:* Tolling transaction of an expired OBE: the data element PaymentMeans-ExpiryDate is older than the current date.

Checking of the acoustic signal of the OBE; checking of the toll transaction record.

*Intention:* Correct signaling of the expired contract by the OBE with four beeps.

Correct OBE data presented by the OBE and collected in the toll transaction record.

<i>Test name:</i>	<b>Transaction – static conditions</b>	<i>No.:</i> <b>1.2.1</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Stand-alone Beacon with EFC Application

*Description:* Put an OBE in communication area of an RSE with fixed BeaconID for more than 5 minutes.

Checking of the acoustic signal of the OBE; checking of the toll transaction record.

*Intention:* Correct behavior of the OBE being in the communication zone of at least 5 minutes: only one transaction is performed.



Correct OBE data presented by the OBE and collected in the toll transaction record.

<i>Test name:</i>	<b>Transaction – software stability</b>	<i>No.:</i> <b>1.2.3B</b>
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*Purpose:* Verification of the stability of the OBE functionality in interaction moving through the communication zone.

*Equipment:* Stand-alone Beacon with EFC Application

*Description:* An OBE shall perform 10'000 transactions by moving through the communication zone.

In the laboratory tests a simulation of the moving through the communication zone with a "DSRC channel simulator" is used based on the behavior described below:

Dynamic RF path loss and phase changes normally arising during the passage of a tolling station are simulated in an anechoic chamber. For this test case, the simulated communication zone shall exhibit strong fading effects. By adjusting the simulated driving speed, the communication duration shall be set to a value in a range between 180 milliseconds and half a second (500 milliseconds) for each transaction.

The test shall be performed separately with 3 samples of the OBE

*Intention:* Testing of stability of OBE software. Each OBE has to perform all 10.000 transactions correctly.

Expected result: Less than 5 missing or incorrect transactions for each OBE. No multiple transactions performed within one passage.

A correct transaction is defined as a transaction delivering enough data for correct tolling to the RSE data base.

<i>Test name:</i>	<b>Tariff correlation and MMI axles selection</b>	<i>No.:</i> <b>1.2.5</b>
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*Purpose:* Verification of the OBE functionality in interaction with the user and the road side equipment.

*Equipment:* Stand-alone Beacon with EFC Application

*Description:* Transactions are performed by OBE with different tariff parameters:

- Base vehicle category: 2, 3 or 4+ Axles
- For base vehicle category 2 and 3 the transaction is performed before and after a change of the axle selection (to all possible categories 3 and 4+) via the MMI.
- European vehicle class (e.g. HGV up to and over 12t, large passenger vehicles)

Observation of the toll transaction records in the database.

Check the OBE axle category or axles number MMI indication of the base category

and/or after the setting by MMI.

*Intention:* Performing of valid transactions with the correct tariff (depends on vehicle category and contract type). Every transaction is performed with the correct tariff according to the active tariff table:

- By base category
- After change of the axles by MMI

Checking the indication of the current axles category and/or number.

<i>Test name:</i>	<b>System stability – broken transactions</b>	<i>No.:</i> <b>1.2.6</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Stand-alone Beacon with EFC Application

*Description:* 15 tested OBEs are put into the communication zone at the same time, until all have signaled a completed transaction.

All OBEs are valid (not expired, not blacklisted, ...)

Observation of the toll transaction records in the MAS Database.

*Intention:* For each OBE one valid transaction is present in the MAS Database: a total of 15 valid transactions with status “transaction completed” is present in the database

<i>Test name:</i>	<b>OBE blacklisted</b>	<i>No.:</i> <b>1.2.8</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Stand-alone Beacon with EFC Application

*Description:* The OBE ID of the OBE is put on the Blacklist of the RSE; the OBE is brought into the communication area.

Checking of the acoustic signal of the OBE; checking of the toll transaction record.

*Intention:* The OBE signals a non valid transaction with four beeps.

Correct OBE data presented by the OBE and collected in the toll transaction record.

<i>Test name:</i>	<b>OBE with blacklist bit</b>	<i>No.:</i> <b>1.2.8A</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Stand-alone Beacon with EN15509 Application

*Description:* OBE with Bit 15 in EquipmentStatus set for blacklisting; the OBE is brought into the communication area.

Checking of the acoustic signal of the OBE; checking of the toll transaction record.

*Intention:* The OBE signals a non valid transaction with four beeps.  
Correct OBE data presented by the OBE and collected in the toll transaction record.

<i>Test name:</i>	<b>Transaction - timing tests</b>	<i>No.:</i> <b>1.3.1</b>
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*Purpose:* Verification of the correct OBE timing according to EN12253 and EN12795 in interaction with the beacon.

*Equipment:* Lab equipment, test beacon.

*Description:* The parameters U1, U1a, U8, U8a, U13, U13a from EN 12253 and T3, T4a, T4b, T5, N3 from EN 12795 are determined by appropriate test setups. The random selection of the public uplink window is checked.

*Intention:* Checking the correct timing according to EN12253 and EN12795.

<i>Test name:</i>	<b>Transaction - behavior at slow motion</b>	<i>No.:</i> <b>1.4.1</b>
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*Purpose:* Verification of the OBE functionality in interaction with the beacon in case of slow entry into the communication zone.

*Equipment:* Multi-lane beacon with beacon controller and EFC Application in an anechoic chamber; beacon is changing the beacon ID automatically for each transaction (or a second beacon is used – without interfering communication zones).

*Description:* OBE is entering and leaving the communication zone slowly (simulated speed equal or lower 6 km/h).

- a) First test run: 300 times; if all transactions OK: passed.
- b) If at first test run there are missing or incomplete transactions: new test run with 1000 cycles.

If error rate < 0,3%: passed.

This test shall be performed using a DSRC channel simulator as described in test case 1.2.3B (dynamic hop simulator). In the simulated communication scenario the possible transaction duration should be configured to a time longer than six (6) seconds.

*Intention:* Transaction error rate shall be less than 0.3%.

<i>Test name:</i>	<b>Transaction - behavior with EasyGo+ and reference OBE</b>	<i>No.:</i> <b>1.4.2</b>
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*Purpose:* Verification of the OBE functionality in interaction with the beacon in a configuration where multiple OBE moving through the communication zone.

*Equipment:* Multi lane beacon with beacon controller and EFC Application in an anechoic chamber; beacon is changing the beacon ID automatically for each transaction (or a second beacon is used – without interfering communication zones).

*Description:* One tested EasyGo+ OBE and one reference OBE (Go-Box) passing the communication zone (the contract of one OBE is blocked).

- a) First test run: 300 times ; if all OBE transactions OK: passed
- b) If at first test run at least 1 ... 3 missing or incomplete transaction: new test run with 1000 cycles

If error rate < 0.3%: passed

This test shall be performed using a DSRC channel simulator as described in test case 1.2.3B (dynamic hop simulator). In the simulated communication scenario the possible transaction duration should be configured to a time longer than three (3) but less than five (5) seconds. All three OBEs have to be mounted in parallel in the test chamber of the DSRC channel simulator.

*Intention:* Transaction error rate shall be less than 0.3%.

### 3.3 Test cases performed at the test site

The test site offers realistic testing conditions without traffic.

<i>Test name:</i>	<b>Communication zone – one beacon activated</b>	<i>No.:</i> <b>3.0.1</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Multi lane beacon with beacon controller (MAS / RSCS/TRC) with echo software. Measuring of the communication zone with only one BCH1210 resp. TRX1220 beacon activated.

*Description:* The antenna lobe of this beacon exhibits 30° vertically and 45° azimuthally opening. The main beam is tilted by 45° to the horizontal direction and points against the direction of the lane. The beacon is mounted at a height of 5.5m to 6.5m. The transmit power level is adjusted to 33 dBm EIRP as specified by EN 300674. The RX sensitivity is smaller than –104 dBm (-110 dBm typically).

The communication zone is determined with the ECHO application.

The following configuration has to be used:

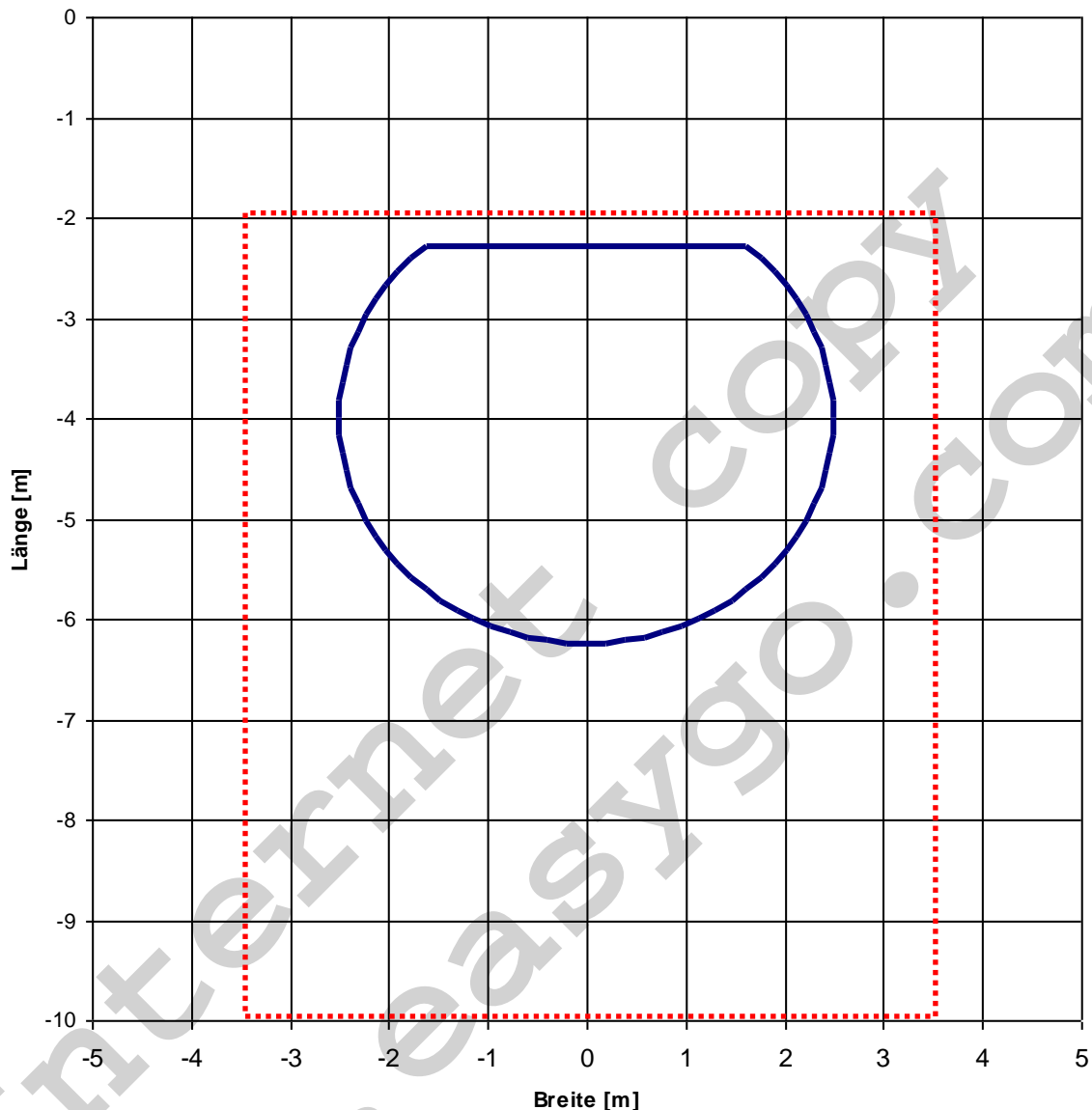
- Echo size: 124+4 Byte
- Number of Echoes: 100

The OBE has to be properly mounted at a height of 2.2m behind laminated glass equivalent to the windscreen of a truck, which is orientated perpendicular to the street surface and perpendicular to the direction of the lane.

*Intention:* At the lateral position of the beacon the communication zone of the OBE shall have a minimum length of 4 m and a width of +/- 2.5 m as shown by the blue line in the figure. The red dotted line shows the maximum allowed size of the communication zone.

The minimum communication zone is defined as the area where the OBE answers correctly more than 95% of all ECHO requests. Outside the maximum communication zone boundaries no OBE communication is allowed.

If the OBE is communicating outside the defined maximum communication zone, depending on the influence of this effect to the system performance, it can be agreed to accept this OBE for operating in EasyGo+ Toll Domains, provided that the OBE is compliant to all relevant standards.



<i>Test name:</i>	<b>Communication zone – all beacons activated</b>	<i>No.:</i> <b>3.0.2</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Multi lane beacon with beacon controller (MAS / RSCS/TRC) with echo software.  
Measuring of the communication zone with at least three BCH1210 resp. TRX1220 beacons activated.

*Description:* The antenna lobes of these beacons exhibit 30° vertically and 45° azimuthally opening. The main beams are tilted by 45° to the horizontal direction and point against the direction of the lane. The beacons are mounted at a height of 5.5m to 6.5m at a mutual distance of 2m to 3m perpendicular to the direction of the street.

Each beacon uses a different channel with a transmit power level of 33 dBm EIRP as specified by EN 300674. The RX sensitivity of each beacon is smaller than 104 dBm (-110 dBm typically).

The communication zone is determined with the ECHO application.

The following configuration has to be used:

- Echo size: 124+4 Byte
- Number of Echoes: 100

The OBE has to be properly mounted at a height of 2.2m behind laminated glass equivalent to the wind screen of a truck which is orientated perpendicular to the street surface and perpendicular to the direction of the lane.

*Intention:* For all tested lanes the communication zone of the OBE shall have a minimum length of 4 m.

The communication zone is defined as the area where the tested OBE answers correctly more than 95% of all ECHO requests.

<i>Test name:</i>	<b>Communication zone – single lane beacon</b>	<i>No.:</i> <b>3.1.1</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment.

*Equipment:* Single lane beacon (BCH 1310/B + MAS / RSCS or BCH1310A/E) with echo software.

Measuring of the communication zone with one single lane beacon (BCH 1310) activated.

*Description:* The antenna lobe of this beacon exhibits 15° vertically and 35° azimuthally opening. The main beam is tilted by 45° to the horizontal direction and points against the direction of the lane. The beacon is mounted at a height of 5.5m to 6.5m. The transmit power level is adjusted to 33 dBm EIRP as specified by EN 300674. The RX sensitivity is smaller than -104 dBm (-110 dBm typically).

The communication zone is determined with the ECHO application.

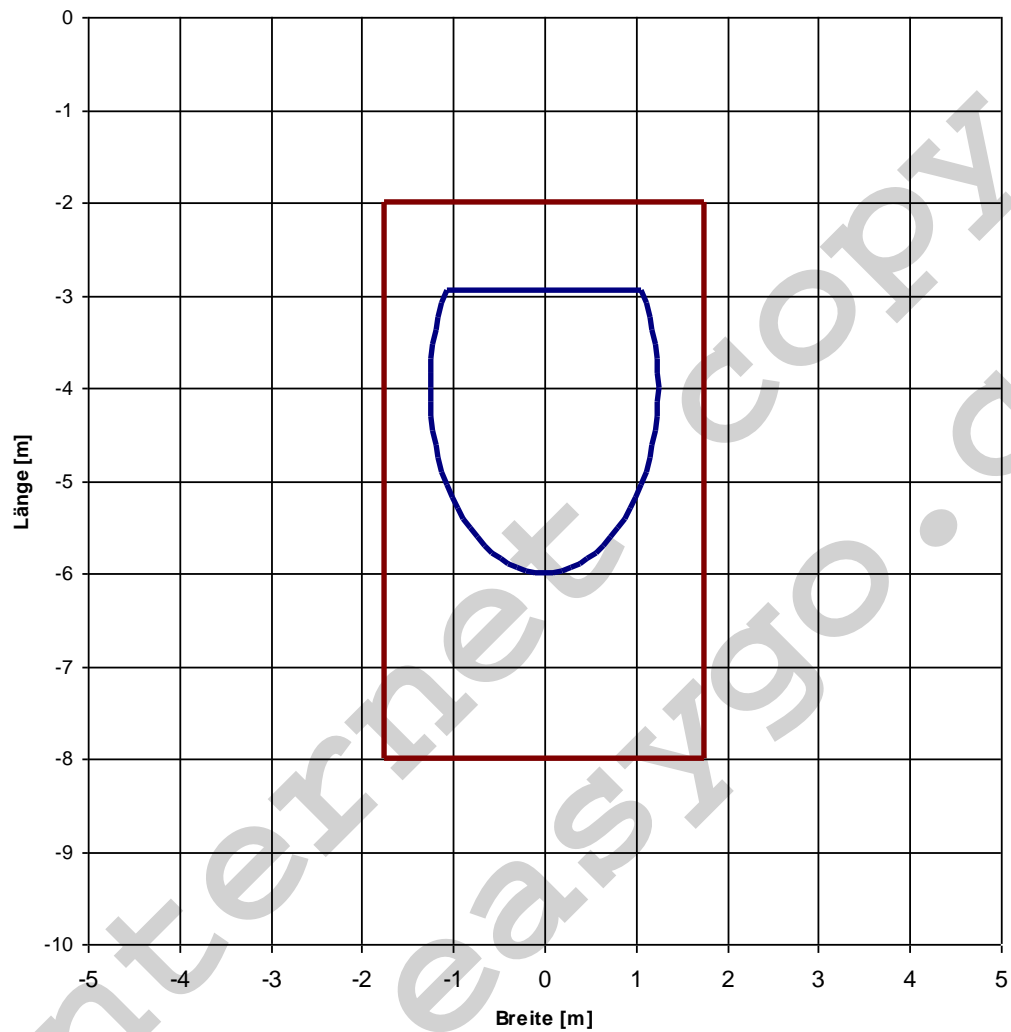
The following configuration has to be used:

- Echo size: 124+4 Byte
- Number of Echoes: 100

The OBE has to be properly mounted at a height of 2.2m behind laminated glass equivalent to the wind screen of a truck which is orientated perpendicular to the street surface and perpendicular to the direction of the lane.

*Intention:* At the lateral position of the beacon the communication zone of the DUT OBE shall have a minimum length of 3 m and a width of 1.25 m as shown by the blue (inner) line in the figure. The red (outer) rectangle shows the maximum allowed size of the communication zone.

The communication zone is defined as the area where the DUT OBE answers correctly more than 95% of all ECHO requests.





## 4 OBE system compatibility tests

### 4.1 Objectives and overview

The main objective of the system compatibility test is to verify the functionality of the OBE in interaction with the road side equipment, standard and enforcement equipment, and to verify the correct processing within the tolling and enforcement system under operating conditions. After performing the transactions, the further processing of the transaction data in all the following systems will be checked.

The second objective is the verification of the EasyGo+ OBE functionality together with a reference OBE being at the same time in the RSE communication zone.

The system compatibility test is divided into two phases. The first tests are performed at the test site. After passing these tests, additional tests on-road will check the system compatibility of the EasyGo+ OBE under real operating conditions.

### 4.2 Test cases performed at the test site

The test site offers realistic testing conditions without traffic.

<i>Test name:</i>	<b>OBE in dynamic conditions</b>	<i>No.:</i> <b>2.0.1</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment with dynamic conditions.

*Equipment:* Enforcement station (SKE) and vehicle.

*Description:* OBE with valid contract (not expired, not blacklisted, etc.).  
Passages are performed with the OBE at 50 km/h and 80 km/h.

Check of the toll transaction and enforcement transaction databases at the SKE.

*Intention:* Correct matching of the toll transaction record with the enforcement data record: for the OBE one valid transaction is created and no enforcement transaction is created.

(The presence of the vehicle's Enforcement data in the table Enforcement\_Raw confirms that the vehicle was effectively detected and that the Enforcement record was matched with the Toll Transaction record.)

<i>Test name:</i>	<b>OBE and GO-Box in the communication area</b>	<i>No.:</i> <b>2.0.3</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment with dynamic conditions in combination with a referenced OBE.

(Use of a replacement GO-Box for an expired or not yet valid OBE in the same vehicle.)

*Equipment:* Enforcement station (SKE) and truck

*Description:* Expired OBE (PaymentMeans-ExpiryDate older than current date) and valid Pre-Pay- GO-Box (not expired, not blacklisted, account not low...) in the same vehicle.  
 Passage is performed with both the OBE and the GO-Box mounted in the vehicle at 80 km/h.  
 Observation of the toll transaction and enforcement transaction databases at the SKE.

*Intention:* OBE and GO-Box perform a transaction (respectively not valid and valid); no enforcement record is created.

<i>Test name:</i>	<b>Multi EasyGo+ OBE in dynamic conditions</b>	<i>No.:</i> <b>2.0.7</b>
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*Purpose:* Verification of the OBE functionality in a multi OBE situation in interaction with road side equipment with dynamic conditions.

*Equipment:* Enforcement station (SKE) and truck

*Description:* Passing through the communication zone with three OBE in one vehicle at the same time: passage with 3 OBE mounted in the vehicle at 80km/h  
 Checking of the acoustic signal of the OBE; observation of the toll transaction database at the SKE.

*Intention:* Each OBE should perform one valid toll transaction: the OBE signals the transaction and a toll transaction record is created in the database.

<i>Test name:</i>	<b>OBE and PKE</b>	<i>No.:</i> <b>13.0.2</b>
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*Purpose:* Verification of the OBE functionality in interaction with portable enforcement equipment (PKE).

*Equipment:* Tolling station (MAS), portable enforcement equipment (PKE), truck with trailer

*Description:* The value of the declared vehicle category (2, 3 or 4+ axles) or the number of axles of the trailer (1 or 2+ axles) in the OBE is lower than the category (=number of axles) of the truck.  
 Passage with the OBE mounted in the vehicle @ 80 km/h.  
 Checking of the acoustic signal of the OBE; checking of the toll transaction and enforcement transaction database at the SKE.

*Intention:* The OBE signals a correct transaction (1 beep). A valid toll transaction record is created in the database. Correct functionality of the MAS+PKE in interaction with the OBE. An enforcement type B shall be generated.

<i>Test name:</i>	<b>OBE MKE readout</b>	<i>No.:</i> <b>9.0.1</b>
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*Purpose:* Verification of the OBE functionality in interaction with mobile enforcement equipment (MKE).

*Equipment:* Mobile enforcement equipment (MKE), truck

*Description:* Various OBE with different OBE data (declared category, base axles class, licence Plate Number, contract type) and different status: account low, contract expired, OBE on Blacklist, OBE on Incident List, etc.

All OBE should have performed MAS/SKE Transaction before read-out with MKE.

Read-out of the OBE in stock-still truck by a passing MKE with a speed of 20 km/h.

Checking of the MKE functionality: simple read-out, displaying on MKE GUI of OBE data

*Intention:* Correct readout and signaling of the OBE. Correct displaying of OBE data and status on MKE side.

### 4.3 On-road test cases

The on-road tests are containing all system compatibility tests not executable at the test site.

<i>Test name:</i>	<b>ETTS OBE on-road tolling</b>	<i>No.:</i> <b>4.0.1</b>
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*Purpose:* Verification of the functionality of OBE in interaction with the road side equipment under dynamic conditions.

*Equipment:* Heavy-goods vehicles (friendly users), tolling stations (MAS), enforcement stations (SKE, SKE S&G), toll booth equipment (EMAS), portable tolling stations (pMAS)

*Description:* The test shall be performed with several (approximately 5) OBE with valid contracts at all station types on the road (live system).

*Intention:* Performing of valid transactions and no enforcement.

<i>Test name:</i>	<b>OBE on-road enforcement</b>	<i>No.:</i> <b>5.0.1</b>
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*Purpose:* Verification of the OBE functionality in interaction with road side equipment with dynamic conditions.

*Equipment:* Heavy-goods vehicle, enforcement stations (SKE, SKE S&G)

*Description:* The test shall be performed with an OBE with incorrect number of axles (OBE not expired, not blacklisted, ...) at all enforcement station types on the road.

*Intention:* Performing of enforcement transactions and check of their correct further handling.

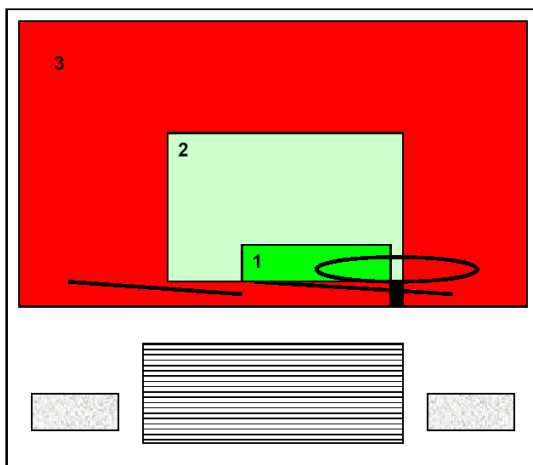
<i>Test name:</i>	<b>OBE EMAS cross reading</b>	<i>No.:</i> <b>12.1.1</b>
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*Purpose:* Verification of the OBE functionality in interaction with an EMAS.

*Equipment:* Toll booth equipment (EMAS), truck

*Description:* Checking if the OBE communicates

- correctly with the beacon of the currently used lane
- not with beacons of other EMAS lanes



OBE is mounted behind windscreen on the outermost position (right or left hand side) of area 2.

Test mounting place of the OBE:

- area 1: optimal position
- area 2: suboptimal position
- area 3: wrong position

*Intention:* Correct transaction with the beacon of the currently used lane and correct signaling of the OBE. Correct displaying of OBE data on the tolling cash desk of the currently used lane.

## 5 Annex A – OBE personalization data

The table below contains the OBE personalization data test sets and the variation for the trailer axles test cases.

The number of trailer axles and the trailer indicator are not part of the permanent OBE personalization and shall be set to a default value of zero. The value for the test is set immediately before the test using the OBE MMI. The values in the table below define the values set for the test cases using the MMI.

Set no.	LPN no	Vehicle Class T CCC LLLL	Vehicle Axles		Euro Value
			Tractor	Trailer	
1	8	X 001 XXXX (not liable)	2	0 - 2	4
2	1	X 011 XXXX (bus)	2	0 - 2	3
3	2	X 011 XXXX (bus)	3	0 - 1	EEV *)
4	3	X 100 XXXX (truck < 12t)	2	0 - 1 -2- 3	0
5	4	X 101 XXXX (truck > 12t)	2	0 - 1 -2- 3	1
6	5	X 111 XXXX (vehicle > 3.5t)	2	0 - 1	2
7	6	X 111 XXXX (vehicle > 3.5t)	3	0 - 1	3
8	9	X 100 XXXX (truck < 12t)	3	0 - 1 - 2	4
9	10	X 101 XXXX (truck > 12t)	3	0 - 1 - 2	5
10	7	X 101 XXXX (truck > 12t)	4	0 - 2	6

**Table 1: OBE personalization data test sets**

\*) EEV coded to VehicleSpecificCharacteristics.EuroValue with value= 15 acc. to [EETS-OBE\_data]

Note: Each test OBE configuration can be identified using the DSRC communication by its unique LPN.

The table **OBE personalization data test sets** defines the values for the following attributes below:

Attribute 16: Vehicle License Plate Number (LPN no)

LPN no.	Country-Code		Alphabet-Indicator b <sub>4</sub> b <sub>0</sub>	Length determinant	LPN coding	LPN content
	b <sub>9</sub>	b <sub>0</sub>				
1	11000	00001 (AT)	000000 (latin 1)	14	WDST1EETS	
2	11000	00001 (AT)	000000 (latin 1)	14	WDST22EETS	
3	11000	00001 (AT)	000000 (latin 1)	14	WDST33EETS	
4	11000	00001 (AT)	000000 (latin 1)	14	WDST44EETS1234	
5	11000	00001 (AT)	000000 (latin 1)	14	WDST5EETS	
6	11000	00001 (AT)	000000 (latin 1)	14	WDST66EETS	
7	10010	10000 (DE)	000000 (latin 1)	14	TÖL777TEST	
8	00110	00011 (NO)	000000 (latin 1)	14	AZ123456789012	
9	01010	11100 (RU)	000000 (latin 1)	14	510dn09	510ДИ09
10	01010	11100 (RU)	000100 (latin/Cyrillic)	14	"510"+ 0xB4+ 0xB8+"10"	510ДИ10

**Table 2: LPN data sets**

Attribute 17: Vehicle Class

The VehicleClass according to EN 15509 has the bit ordered substructure T CCC LLLL, where:

- T = Trailer Indicator
- CCC = Harmonized European Vehicle Class
- LLLL = Local Vehicle Classes

Attribute 19: Vehicle Axles

- VehicleAxlesNumber.NumberOfAxles.Trailer
- VehicleAxlesNumber.NumberOfAxles.Tractor

Attribute 22: Vehicle Specific Characteristics

- EnvironmentalCharacteristics.EuroValue

For additional information to the attributes see [EETS-OBE\_data] and [EFC API] chapter 'EFC Attributes'.