



AP-2.2

AutoPASS

TSP Suitability for use Test strategy

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DOCUMENT STATUS

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Document Version log

The purpose of the document version log is to describe the development of the document including the changes.

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1.0	04.09.19	NPRA	Doc. “5.6 AutoPASS TSP Suitability for use Test strategy”
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2.0	24.11.20	NPRA	Minor modification. Removed table header “free flow” in chapter 5.1
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1 INTRODUCTION

1.1 AUTOPASS SAMVIRKE

AutoPASS Samvirke is the network for electronic payment of tolls on public roads and tickets on public ferry services in Norway. This network ensures interoperability between the parties in AutoPASS Samvirke. The Norwegian Public Roads Administration (NPRA) is responsible for the direction and management of the network.

AutoPASS Samvirke consists of the following parties:

- Interoperability management (NPRA and AutoPASS Forum)
- Toll chargers (TC)
- AutoPASS Toll service providers (TSP)
- Service Users (SU)

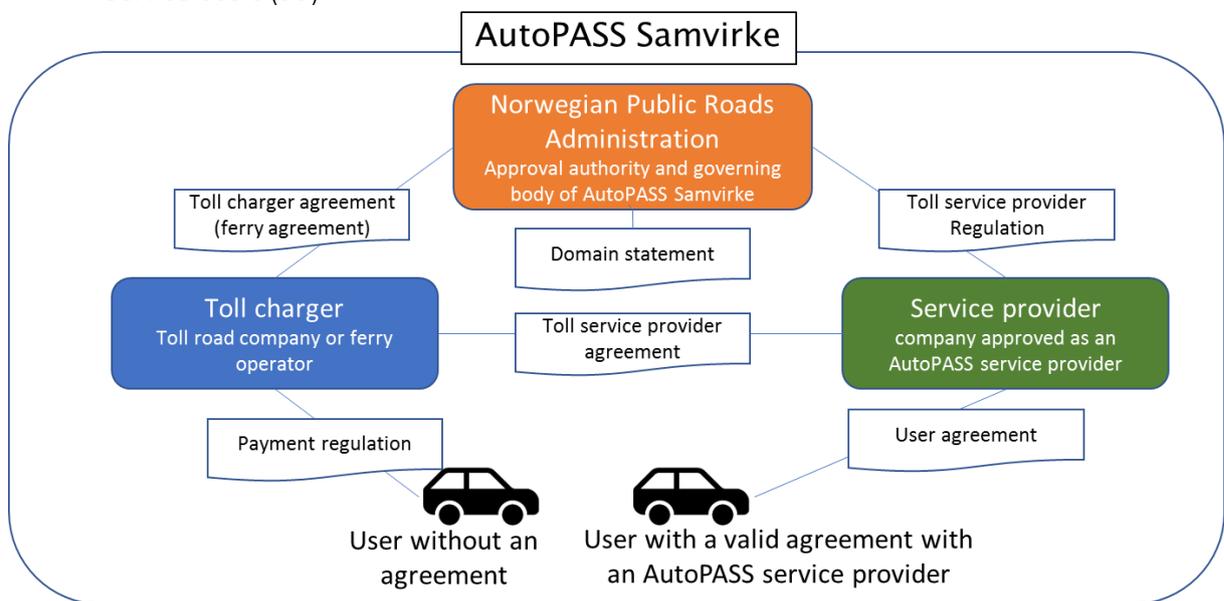


Figure 1: Model showing the parties in AutoPASS Samvirke and their contractual and legal relations.

The NPRA has (in cooperation with AutoPASS Forum) authority to specify technical and operational requirements for equipment used by any actor in AutoPASS Samvirke.

1.2 SCOPE OF DOCUMENT

This document is a test strategy for “suitability for use”-test, describing the principles for testing when changes in AutoPASS Samvirke occur. This testing is necessary when a new actor is introduced and/or there are significant changes in an actors’ equipment. This document gives a general overview of when testing is required, which tests to perform and how the tests shall be carried out. The goal of the testing described in this document is to verify the correct functionality and interfaces between an actor and the AutoPASS HUB and/or between actors. The required test steps and the extent of the testing may vary depending on the actual situation.

Focus in this document is testing when a new AutoPASS TSP is introduced, but also other scenarios are shortly described.

Detailed test procedures and specifications are not described in this document. The document does not provide details regarding file exchange between the actors' central system and the AutoPASS HUB. These details are described in separate documents.

The AutoPASS TSP: Suitability for use test strategy is consistent with the EasyGo test strategy as described in EasyGo doc. 206 Test Strategy (ref.[8]). Some descriptions in this document are based on or copied from doc. 206.

It must be emphasized that there is a separate test methodology/strategy for verification of the AutoPASS system architecture (ref.[5]). This test methodology has focus on acceptance testing of the deliverables, mainly AutoPASS HUB, AutoPASS IP and the actor's central system solutions, including the communication between these system parts. It is a prerequisite for the "suitability for use"-test described in this document that the initial acceptance tests for the basic AutoPASS infrastructure described in the test methodology in ref.[5] are performed successfully and that the basic systems are in stable production. However, there are parts of the test methodology in ref.[5] which deals with connection of a new actor, and these tests are applicable also in this "suitability for use"-test and will be referred to. With regard to functionality in the systems of an actor (TC/TSP) or in AutoPASS IP/HUB, this "suitability for use"-test is purely a "black box" test for the communication interface. If the tests reveal internal problems in such systems, the tests are stopped and will only resume when such errors have been corrected.

The tests described in this document do not include internal FAT or SAT testing performed by an actor (TC/TSP) on his equipment (e.g. RSE, CS or OBE ...) prior to the Integration Test1 (INT1), which is the first common testing between AutoPASS HUB and TCs/TSPs. It is a precondition prior to start of tests with AutoPASS that an actor (TC/TSP) has a stable implementation of the required functionality on his test or production system depending on the test to be performed.

This document distinguishes between AutoPASS TSPs and EETS TSPs. The requirements regarding testing are the same independent of the type of TC or TSP.

1.3 OVERALL TECHNICAL APPROVAL AND TEST PROCESS FOR A NEW TSP

A complete technical verification process for a new operational TSP, including the test activities in the commissioning phase, comprises the following steps:

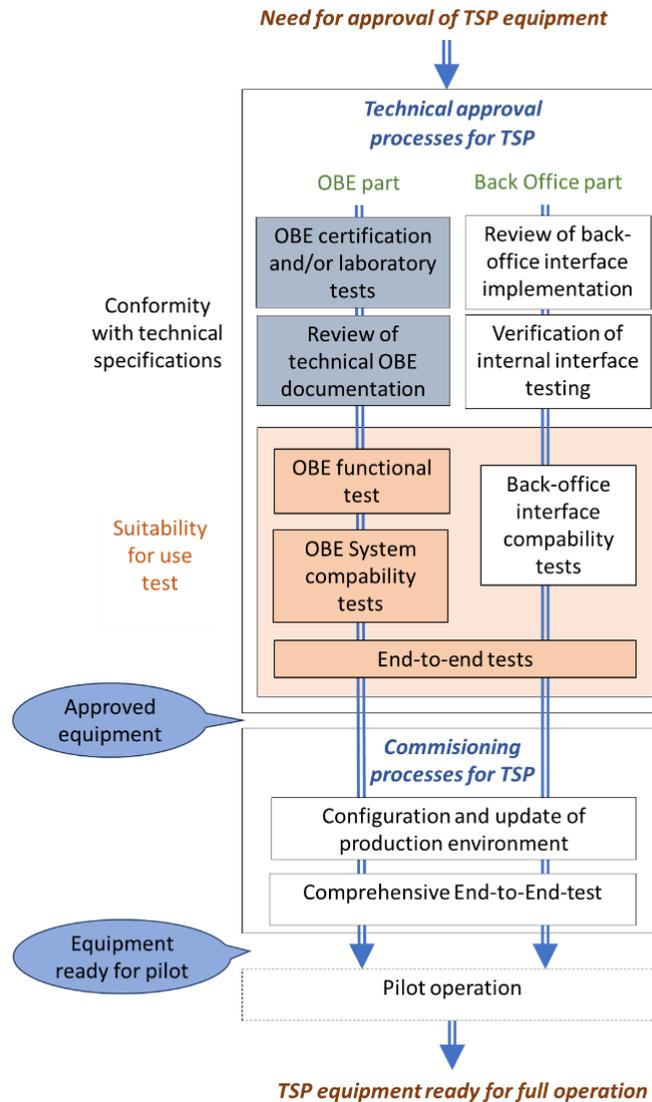


Figure 2: Full approval process for a new AutoPASS TSP

The main purposes of the various approval/test stages are as follows:

1. Conformity with technical specifications: Review of technical specifications for the OBE, as well as the Declaration of Conformity for the TSP equipment
2. Suitability for use test: Test of interfaces between TSP system and AutoPASS HUB, communication between road side (RSE) and OBE, and limited E2E-test in selected RSE
3. Comprehensive E2E test: When the production environment for the new TSP (with OBE) is fully configured, more comprehensive E2E-tests in a representative range of RSE is performed to test for substantial variations in the production environment
4. Pilot operation: Verification of technical, administrative and commercial processes in small-scale operation

Test no. 1 is a “document test”, while an overview of test no. 2, 3 and 4 is presented below. The overview is intended to show how the different test phases together form an overall test approach with regard to different test scopes and environments.

	2. Suitability for use test	3. End-to-end test	4. Pilot operation
Main purpose	To be approved as an AutoPASS TSP it is necessary to test that the TSPs equipment satisfy given requirements	To verify that TSPs are functioning as intended when fully installed in the production environment	To verify that all technical, administrative and commercial processes are well-functioning in small-scale operation and thus are ready to be commissioned full-scale
OBE test environment	In different test phases: <ol style="list-style-type: none"> In the lab of all RSE suppliers In test RSEs installed on road In a few operative AutoPASS RSEs, one from each RSE provider. 	In real AutoPASS RSE (as all RSE are configured, any AutoPASS RSE is possible). Practically, driving tests are required in representative RSE from all RBPS as well as all RSE suppliers. If relevant also different versions of RSE from suppliers.	In any real AutoPASS RSE. There are no requirements to the selection of AutoPASS RSEs used for this pilot operation, but a certain volume of transactions is required.
Interface test environment	In different test phases: <ol style="list-style-type: none"> In test environment In production environment 	In production environment	In production environment
Generally about test scope	All connected systems are tested as “black boxes” at the interface level. E2E testing does not cover TSP CS internal processing of transactions, but verifies that the correct OBE transaction is transferred to the TSP CS and acknowledged correctly.	In addition to the tests described under test 2 “Suitability for use” test, TSP shall confirm that transactions are cleared correctly against customer account	TSP must confirm that transactions are invoiced correctly to the customer. Other technical, administrative and commercial processes must work according to requirements

1.4 DOCUMENTS RELATED TO TESTING

The most important reference documents related to testing are:

Ref. no.	Doc no.	Document title	Reference
[1]	(not published)	Template AutoPASS TSP Suitability for use Test Plan	A template for the test plan to be developed by the actor requests the change and/or applies for being part of AutoPASS Samvirke
[2]	AP-1.2 (a/b)	AutoPASS Data formats	All data formats used in the interfaces to AutoPASS HUB
[3]	AP-1.6	Requirements for On-board Equipment (OBE) for use in AutoPASS Samvirke	Minimum requirements to the OBE to be fulfilled by the TSP that applies for being part of AutoPASS Samvirke
[4]	AP-1.5b	Krav til AutoPASS vegkantutstyr (Requirements for Charging Points)	Minimum requirements to the RSE to be fulfilled by the TC acquires a RSE to be integrated in AutoPASS Samvirke
[5]	AP-2.4	Test description of interface with AutoPASS HUB	Deliverable of PNSB (project program for AutoPASS Infrastructure). Test description for verification of interface files.

[6]	AP-2.3	OBE Test description- AutoPASS TSP Suitability for use	Description of tests of OBE to be used in AutoPASS Samvirke
[7]	EasyGo doc. 203	(EasyGo doc, referred to in 4.3) Technical requirements, data formats and interface specifications	The formats used in the back-office data exchange in EasyGo, also in AutoPASS
[8]	EasyGo doc. 206	EasyGo Test Strategy	
[9]	EasyGo doc. 207	Interface test specification. Central Systems – EasyGo HUB	
[10]	EasyGo doc. 403	EasyGo Processes	
[11]	-	Prosessbeskrivelser i test til kvalitetssystemet	Description of processes for suitability of use tests

Table 1 – Reference documents relevant for testing

1.5 STANDARDS RELATED TO TESTING

Document Ref	Document title
TS 14907	EFC - Test procedures user and fixed equipment Part 1 Test procedures user and fixed equipment Part 2 Conformance test for the onboard unit application interface
EN15876	EFC - Evaluation of on-board and roadside equipment for conformity to EN 15509 Part 1: Test suite structure and test purposes Part 2: Abstract test suite
CEN/ISO TS 17444-1	EFC - Charging performance Part 1: Metrics Part 2: Examination framework

Table 2 – Standards relevant for testing

2 GENERAL TEST PRINCIPLES

2.1 TYPES OF «EVENTS» TO BE TESTED

The following main “events” require testing:

1. Inclusion of new AutoPASS TSPs
2. Inclusion of new AutoPASS TCs
3. Introduction of new OBE by AutoPASS TSPs
4. Changes made by TCs, TSPs or AutoPASS HUB/IP.
5. A TSP (or TC) terminates operation, withdraws from the AutoPASS service or no longer uses the AutoPASS HUB

Point 1 above is the most important objective of this document. Unless otherwise stated, the descriptions in chapter 2 and 3 apply for this event. TSPs applying for being AutoPASS service providers must document compliance with specifications for OBE and interfaces to the AutoPASS infrastructure. The applicant must provide declarations of conformity for all relevant requirements of OBE standards and European directives, test reports for any compliance tests / certifications where this is required in the technical specifications, complete product description for OBE, and self-declaration that the central system holds the necessary functionality to exchange information with the AutoPASS HUB as described in the Interface Specification. A precondition is that this has been accomplished and approved in the application process.

With regards to point 2, there are established five regional TCs in AutoPASS Samvirke. New road tolling TCs are not expected, but the NPRA may approve a new ferry operator as a TC in AutoPASS Samvirke. A ferry operator is technically somewhat different from a toll road TC as all ferry operators are connected to AutoPASS HUB through a common national central system for ferry fee collection. The operator of the common central system for ferry fee collection is responsible for interoperability with AutoPASS Samvirke on behalf of all connected ferry operators. The test description in ref.[5] applies for such changes and therefore not covered by this test strategy.

When a TSP introduces new OBE (point 3), the testing depends on if the new OBE are:

- A. New type of OBE not currently used in AutoPASS
- B. New batch of OBE already used by the same TSP, but with changes in firmware (by supplier), new personalization procedures (by TSP) or other changes
- C. New batch of OBE already used by another TSP
- D. New batch of OBE already used by the same TSP

Alternative A requires the most comprehensive testing while test procedures for B, C and D will be less extensive.

Point 4 can be any type of change by TC, TSP, AutoPASS HUB/IP or in the interfaces to/from AutoPASS HUB. Typically, - for an existing TC, this may be a new toll station and/or new RSE equipment. However, there are separate test strategies that shall be followed when a new RSE is tested. For testing of changes in AutoPASS IP/HUB, the test description in ref.[5] applies and therefore not covered by this test strategy.

The test requirements include some general procedures/checklists, but also some procedures that need to be defined on a case by case basis.

Point 5 does not require testing but needs to be verified by checklists, which are described in separate documents.

Based on the above there are four main types of events to be tested:

Test scenarios	Test procedures	Approval criteria
1 Inclusion of new AutoPASS TC	Predefined	Predefined
2 Inclusion of new AutoPASS TSP	Predefined	Predefined
3 Introduction of a new type of OBE by AutoPASS TSP	Predefined	Predefined
4 Changes made by an AutoPASS TC, TSP or AutoPASS HUB/IP	Partly predefined and partly case by case	Partly predefined and partly case by case

Table 3 – Main test scenarios

Test procedures and approval criteria for test scenarios 1-3 can be/are predefined while scenario 4 needs to be described in detail for each project.

Appendix 1 gives an overview of which processes need to be tested during E2E testing.

Appendix 2 includes check lists for each of the main test scenarios 1-4. These check lists can also be used to produce similar check lists for minor changes or inclusion of external TCs or TSPs which may require less extensive testing compared to these four.

2.2 INTERFACES TO BE TESTED

Figure 3 below shows the AutoPASS actors and the data exchange interfaces subject to testing.

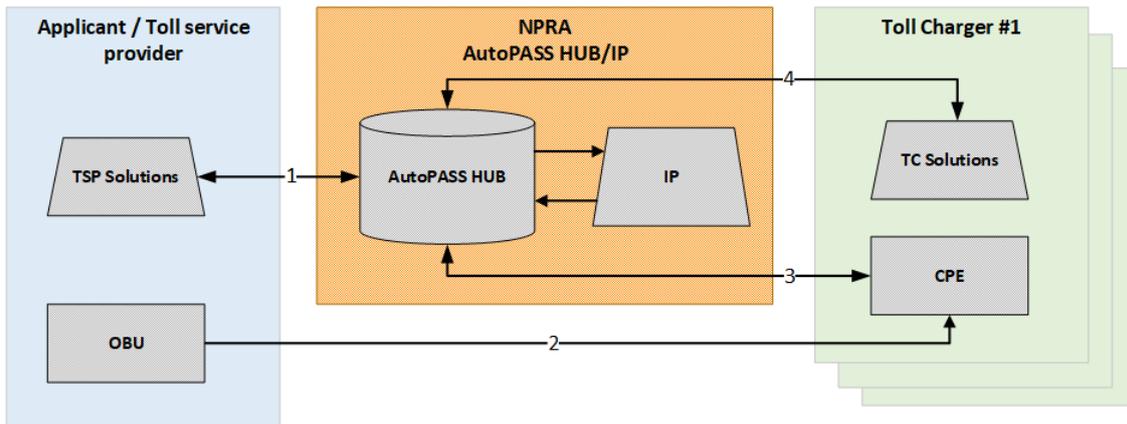


Figure 3 - AutoPASS actors/systems and data exchange interfaces subject to testing

The requirements and related test specifications for the interfaces are:

- *Interface (1) and (4) between AutoPASS IP, TSP CS and TC CS via the AutoPASS HUB (also including internal interface as e.g. between AutoPASS IP and AutoPASS HUB):*
 - *ref.[2]*
 - *ref.[5]*

- *Interface (2) between TSP OBE and TC RSE:*
 - *ref.[3]*
 - *ref.[4]*
 - *ref.[6]*

- *Interface (3) between TC RSE to AutoPASS IP via the AutoPASS HUB:*
 - *ref.[4]*
 - *ref.[6]*
 - *ref.[2]*
 - *ref.[5]*

As the main objective of this test strategy is testing when a new TSP is introduced, the interfaces subject to be tested are between TSP OBE and TC RSE – marked (2), and between AutoPASS IP and TSP Solution via the AutoPASS HUB – marked (1) in the figure above. To test interface (1) a special test package/tool (described in ref.[5]) is provided.

2.3 TYPES OF TESTS TO BE CARRIED OUT

2.3.1 General

According to of Figure 2, a new OBE for an existing AutoPASS TSP follows the approval/test processes shown in the OBE part of the figure including common activities while full approval of a new TSP follows all activities.

The tests of any new or changed equipment shall verify its conformance to technical specifications, agreed operational procedures and the suitability for use within the context of AutoPASS. Equipment is suitable for use if it works according to the defined AutoPASS quality levels and fulfils the service level agreements defined within AutoPASS. Depending of the actual type of new or changed equipment that is subject to testing, AutoPASS management and AutoPASS Forum will decide which test steps shall be performed and to which extent.

Approval criteria for each of the test steps shall be defined in the test specifications by the test manager.

2.3.2 Test of new OBE

Both event 1 and 3 described in chapter 2.1 will generally involve test of new or modified OBE. Chapter 2.1 also describes different scenarios A-D for a new or modified OBE. Depending on the actual scenario the test team must decide how much testing is needed.

Test-OBE for the (new) TSP must be sent to all AutoPASS TCs. If the TCs do not have adequate test facilities themselves, the OBE must be forwarded to their RSE suppliers. It is important that OBE are tested in equipment provided by all RSE suppliers having operational installations in AutoPASS. Currently there are four RSE suppliers in AutoPASS, and two of them have both old and new versions of RSE equipment. As differences in behavior of this equipment can be expected, a test may be conducted on all versions of equipment.

OBE shall be tested in laboratory environment and/or in test RSE installed on roads, - on equipment according to the specifications given by NPRA. In the E2E test in production environment, the OBE shall also be tested in a few AutoPASS RSEs in operation, one from each RSE provider.

When introducing new OBE, the TSP shall perform FAT and SAT before joint tests with AutoPASS in a suitability for use test can be initiated.

The tests related to new OBE will differ if the OBE are a new model introduced by an existing TSP or if a new TSP seeks to join AutoPASS using an already known OBE model.

A detailed description of OBE tests involved in approval of a new or changed OBE is given in [ref.6].

2.3.3 Integration tests

Figure 4 below shows the joint tests to be specified and performed within the scope of AutoPASS TSP Suitability for use test.

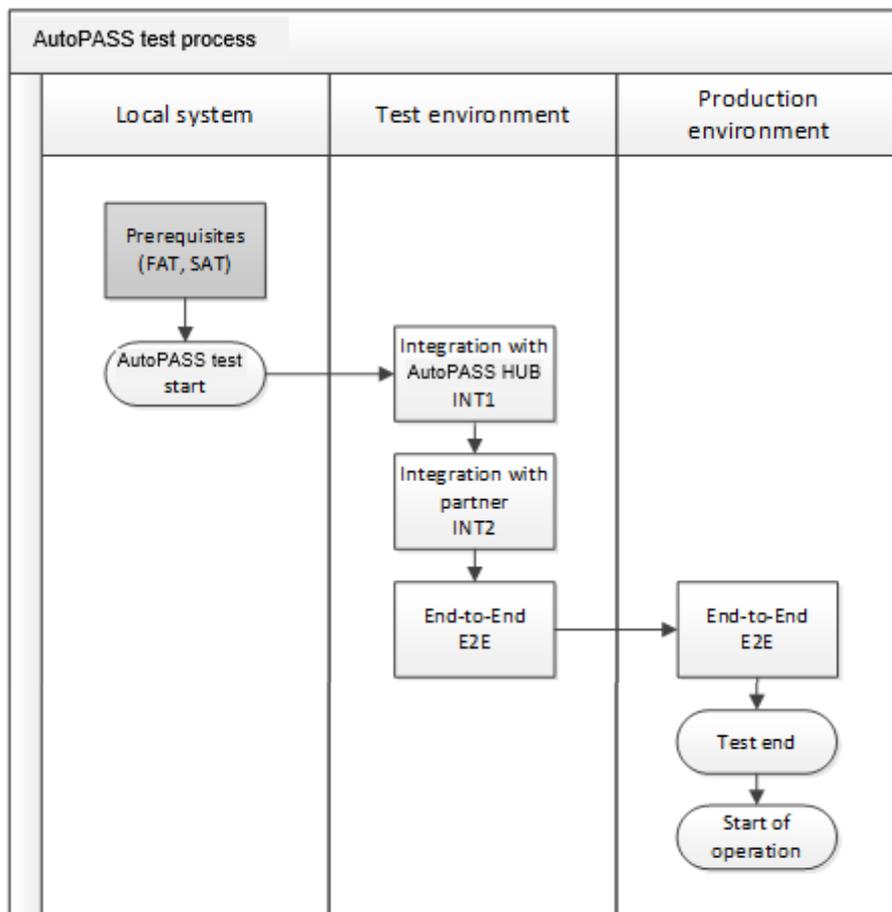


Figure 4 - AutoPASS test steps

According to of Figure 2, the Back-office interface compability test is divided in two parts INT1 and

INT2 where INT2 also contains OBE system compability tests.

The test steps are:

Integration test 1 - INT1 (Integration with AutoPASS HUB)

This test shall verify the data exchange between the TC's/TSP's CS and the AutoPASS HUB, and includes the following file types:

- AIT (*accepted issuer table*)
- ACT (*actor table*)
- TST (*toll station table*)
- Whitelist / HGV
- TIF (*transit information file*) and TIC (*TIF confirmation file*)
- ALM (*Alarm / Event message*) and ALC (*Alarm confirmation*) (not currently in use)

Ref.[2] and ref.[5] describe all formats and technical principles in this file exchange.

To test these interfaces a special test package/tool (described in ref.[5]) is provided.

The INT1 must be carried out with a satisfactory result before INT2 can commence.

Integration test 2 - INT2 (Integration with partner)

Any TC, and for equipment provided by all RSE suppliers, must verify that he can read all the OBE issued by AutoPASS TSP. See chapter 2.3.2.

Transactions of all the new types of OBE shall be included in the INT2 test. (OBE – RSE – AutoPASS HUB/IP - CS_{TC} / CS_{TSP}).

This test shall also, - as INT1, verify the data exchange between the AutoPASS IP, TC's CS and the TSP's CS (via the AutoPASS HUB), and includes the following file types: (ACT, AIT, TST,) HGV, TIF and TIC.

The INT2 must be carried out with a satisfactory result before E2E tests can commence.

End to end test - E2E

E2E tests for a new TSP has the following scope:

An AutoPASS contract/OBE is established by the TSP. This valid OBE is detected by a TC's RSE and a transaction is generated and transferred to AutoPASS IP. Correct price is set by AutoPASS IP and a priced transaction is transferred through the AutoPASS HUB to the TSP's CS and cleared. TSPs CS acknowledges this transaction.

Processes internal in the TSPs CS, as e.g. that a corresponding invoice is generated according to the user contract with the TSP, are not part of this E2E test.

Other processes in the interface between the actors, e.g. that the TC is paid accordingly, and that the TSP is generating a corresponding issuer fee invoice for the TC, are also outside the scope of this test, but it must be verified that the correct financial amount for these settlements are communicated.

E2E tests are first performed in the test environment and any new functionality/changes may only be implemented in the production environment if the tests have been passed. Test of transactions in the test environment may be done using simulated transactions if no physical test environment is available on the RSE.

The E2E tests in the production environment will be carried out by test personnel. No real customers are involved.

The E2E test will cover a number of scenarios where an interoperable contract is established for the test personnel. Based on the type of contract, transactions are made within the various TC’s equipment. The status of the contract may be changed as well as various types of enforcement situations are set up according to the test procedures.

When new OBE are introduced the TSP shall perform E2E tests with the new OBE in cooperation with chosen AutoPASS TCs.

When the E2E test has been executed and approved in a test environment the same test shall be executed in the production environment. Tests of transactions may only be done using physical OBE and RSE transactions.

A TC needs to test and verify all relevant AutoPASS processes in which he has a role. These are (See Appendix 1 “Processes to be tested during E2E test”):

Process	Involves
4.3- Originate EFC context data	TC, HUB, TSP
4.6- Distribute validation data	TC, HUB, TSP
5.1- Data exchange RSE- OBE	TC, TSP
5.2- TC (RSE) generates transactions	TC, HUB, TSP
5.3- IP (on behalf of a TC) reports billing details to TSP (TIF)	TC, HUB, TSP

Table 4 – Processes to be tested during E2E for TC

A new TC needs to perform E2E tests with all types of OBE.

A new TSP needs to test and verify all AutoPASS processes in which he has a role. These are:

Process	Involves
4.3- Originate EFC context data	TC, HUB, TSP
4.5- Open a contract	TSP
4.6- Distribute validation data	TC, HUB, TSP
5.1- Data exchange RSE- OBE	TC, TSP
5.2- TC (RSE) generates transactions	TC, HUB, TSP
5.3- IP (on behalf of a TC) reports billing details to TSP (TIF)	TC, HUB, TSP
5.5- TSP claims payment from SU for service usage	TSP
5.7- Change contract data	TSP
5.8- Exchange OBE	TSP
5.9- Close contract	TSP

Table 5 – Processes to be tested during E2E for TSP

Processes 5.5.-5.9 are not explicitly tested in this suitability for use test, but a verification of the availability of the basic functionality and data for these processes is necessary.

The E2E tests in test environment must be carried out with a satisfactory result before E2E tests can commence in the production environment.

2.4 START OF OPERATION - TRIAL OPERATION

When the Suitability for use E2E tests have been completed and approved, and all other activities listed under Test exit criteria in chapter 3.9 are accomplished, the Suitability for use test is completed and TSP approved. The date for commissioning with full scale operation must be decided, and the preparation of the commissioning phase may start.

The commissioning phase involves the activities described in chapter 1.3. It is outside the scope of this test strategy to describe the tests in the commissioning phase in detail, but briefly there is a need for the following steps before full commercial operation can start:

- There must be conducted a complete configuration in all relevant systems in AutoPASS, also in all RSE in AutoPASS, to accept the new TSP and/or OBE.
- When this is done, it must be arranged an E2E test to confirm the test results in an operative production environment.
- Normally (depending on the nature of the change) there is a need for a trial operation with limited scope/volume. This is to verify that TSPs equipment, as well as other technical, administrative and commercial processes, are well-functioning in small-scale operation and thus are ready to be commissioned full-scale

The preparation for the trial operation should start at a much earlier stage to acquire and prepare the SUs (drivers and organizations) involved in the trial operation. Transaction handling, customer service or other processes (e.g. claim handling) during the trial operation shall be part of the normal service even if special attention and handling is necessary to some extent. It is important that the customer service and operations personnel are informed and receive adequate training in advance.

During the trial operation, real (“friendly”) service users will use all the AutoPASS functions for paying their tolls.

3 TEST PLANNING, MANAGEMENT AND REPORTING

3.1 TEST PLANNING

The general process steps for planning and executing a conformance test is shown in figure 5 below:

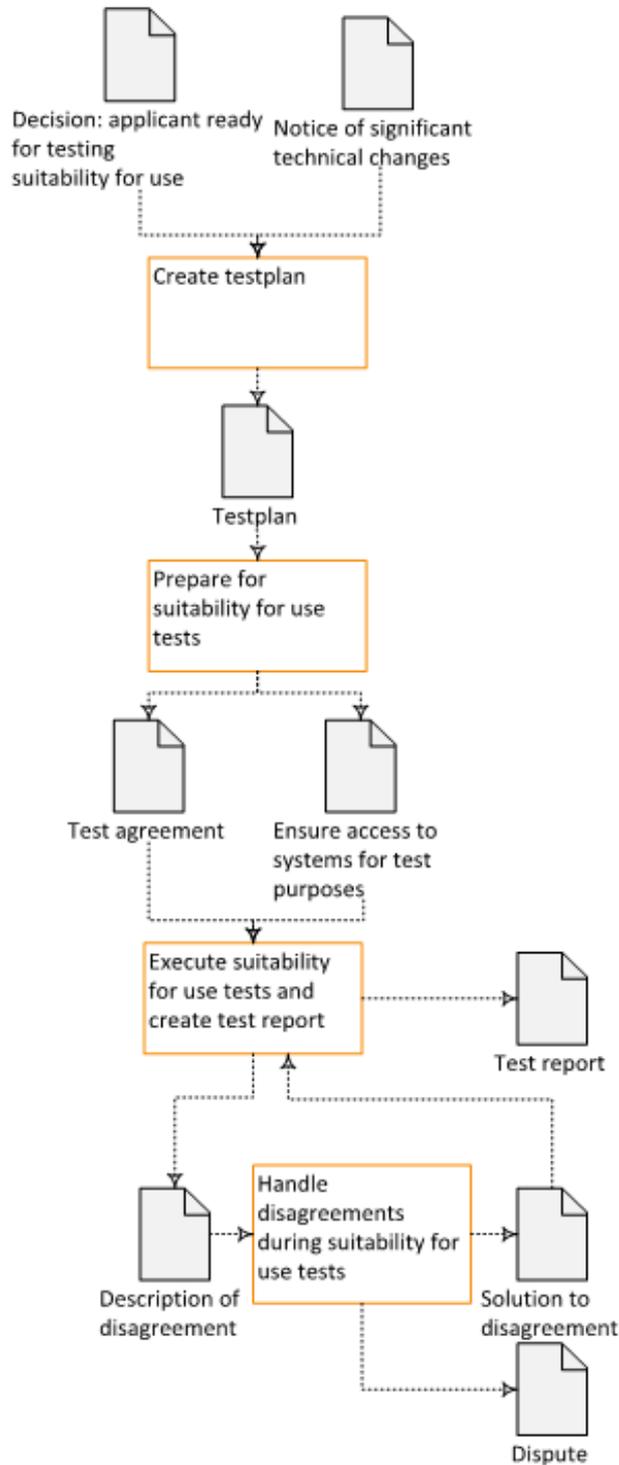


Figure 5 - AutoPASS test process

The process and subprocesses are described in the document “Prosessbeskrivelser i test til kvalitetssystemet” (ref.11]).

3.2 TEST PLAN

The test plan must give an overall description of how the tests shall be carried out and which resources are needed. It must have sufficient information for all participating actors to know their responsibilities and must provide a common management tool for the test. It must contain:

- Test description
 - Objectives
 - Test entry criteria
 - Test exit criteria
 - Test acceptance criteria
- Test methods and tools
- Test data
- Test resources (*)
- Test scenarios
- Participants and roles
- Schedule
- Plan for compilation of test results and reporting

(*) Consistent with the estimated test resources listed in the test plan, test agreements must be written between the applicant and all affected actors. These test agreements must define all the resources necessary to perform the test and commit the actor to providing these resources.

The test plan shall define, for each test step, which parts of the systems that need to be tested. It also defines the sequence of the tests.

According to ref.[1], the NPRA will provide a template for the Test Plan with contents as indicated above. The actual actor/applicant (e.g. a TSP) prepares a draft test plan based on this template where the other parties (according to the role scheme in chapter 3.3) shall be consulted.

The Test Plan must be approved by NPRA.

3.3 TEST ORGANISATION

The test organization including roles and responsibilities shown in a RACI matrix on the next page. The RACI matrix uses the following abbreviations to describe the roles and responsibilities of the involved parties:

- R** Responsible – this is an actor who is responsible for conducting and completing a task or an activity. This role can be shared between several actors.
- A** Accountable – this is the actor who is ultimately answerable for the correct and thorough completion of the task or activity. There is only one accountable for any given task.
- C** Consulted – this is an actor who is to be consulted before a task or an activity is completed.
- I** Informed – this is an actor who is to be informed after the completion of a task or an activity.

AP-2.2 AutoPASS TSP Suitability for Use – Test Strategy

#.	Activity	Test Manager (Applicant)	Test Coordinator (NPRA)	Test team (Applicant)	Test team (Toll Charger(s))	Test team (NPRA)	Case officer (NPRA)	Authoritative body (NPRA)
1	Recommend commencement of testing	I	I	I	I	I	A & R	
2	Prepare test plan	A & R	C & R	C	C	C	C	
3	Recommend the applicants test plan	I	R	I	I	I	A	
4	Approve the applicants test plan	I	C	I	I	I	C	A & R
5	Conclude test agreements	A	C & R	R	R	R	I	
6	Ensure access to systems for test purposes	A	C & R	R	R	R	I	
7	Implement and coordinate changes to the test plan	A & R	C & R	C	C	C		
8	Receive and distribute test plan	A	R	I	I	I	I	
9	Execute test activities	A	C	R	R	R		
10	Provide clarifications during testing		C & R				A & R	
11	Assist applicant in coordinating test activities	C	A & R	C	C	C		
12	Observe test execution		A & R					
13	Prepare test report	A & R	C & R	C	C	C		
14	Recommend conclusion of testing	C	R	C	C	C	A	
15	End testing	C	C	I	I	I	R	A
16	Approve applicant as AutoPASS toll service provider	I	I	I	I	I	C	A & R
17	Notify NPRA of a party's lack of cooperation or commitment	C	A & R				C	
18	React to notification of a party's lack of cooperation or commitment	I	C	I	I	I		A & R
19	Handle disagreements between the parties involved in testing	I	C	I	I	I	A & R	

Table 4 – RACI-matrix for test of suitability for use in AutoPASS Samvirke

There are 3 leadership roles in a such test:

(Applicants) Test Manager	“Applicant” in this context means the main actor that have initiated the event (according to Table 3) to be tested. It is usually a TSP but may also be a TC. This actor is responsible for the planning and progress of the test. See further description in chapter 3.4.1.
Internal test leader	“Internal” in this context means all the other actors that are affected by the change, and therefore must have a role in the testing.
Test coordinator	This is an appointed “independent” person who has the responsibility of coordinating the affected actors and the activities in the test. See further description in chapter 3.4.2.

Each actor shall define the required personnel to perform the tests. For each new project, test persons at relevant organizations are appointed prior to the start of the project.

The implementation and testing of new or changed functionality will as a minimum be performed by affected actors (TC/TSP) in addition to NPRA and the responsible party for the AutoPASS HUB/IP operation. Other AutoPASS TCs, TSPs and/or external actors are involved in tests to the extent necessary to secure that the new/changed functionality works throughout the entire AutoPASS services.

It will be the new actor or actor introducing the change who shall perform the necessary tests with the support of the existing actors (TC/TSP) to verify the AutoPASS functionality while NPRA will supervise and approve the tests.

3.4 RESPONSIBILITIES

3.4.1 Test Manager

The test manager is responsible for the overall test progression and is also responsible for creating the test report to be issued to the NPRA after testing is complete. The test manager shall be appointed from the party that initiate the change through introducing new or changed equipment in AutoPASS Samvirke.

- For applicants seeking approval as AutoPASS service providers, the applicant shall appoint a Test Manager
- For changes or introduction of new road side equipment, the Toll Charger responsible for the equipment shall appoint a Test Manager

3.4.2 Test Coordinator

The test coordinator is appointed by the NPRA, and shall assist the Test Manager in coordinating test activities between the involved parties. The test coordinator shall also assist the Central Test Manager by making available previous lessons and experiences from testing in AutoPASS Samvirke.

The Test Coordinator is responsible for:

- Assisting the Test Manager in coordinating test activities between the parties
- Notifying the NPRA in the event of lacking cooperation or commitment from one of the parties, when this issue cannot be solved bilaterally

- Observe the tests and assess the results and comments reported to the Test Manager
- Forwarding the test rapport created by the Test Manager to the NPRA, along with a written statement summarizing the test coordinator's observations after tests are completed.

3.4.3 Toll Charger

The TC is in charge of performing any tests regarding:

- communication interfaces of the back-office data exchange (e.g. VPN connection)
- data formats of the back-office data exchange interfaces to the AutoPASS HUB
- communication between the Road Side Equipment (RSE) and the OBE through the DSRC interface
- data transfer from RSE to AutoPASS HUB
- central system of the TC which could influence the overall availability and performance of the AutoPASS services

The TC is responsible for:

- nomination of a test team, including an internal test manager to participate in testing
- nomination of a system responsible with sufficient knowledge about the system under test
- documenting the test results including test protocols and proof documents
- reporting the results to the Test Manager
- provision of sufficient test resources to meet the test schedule agreed in test plan

3.4.4 Toll Service Provider

The TSP is in charge of performing any tests regarding:

- communication interfaces of the back-office data exchange (e.g. VPN connection)
- data formats of the back-office data exchange interfaces to the AutoPASS HUB
- OBE in use (e.g. software/firmware update where applicable)
- introduction of new OBE
- personalisation of OBE (where applicable)
- security for the interfaces or equipment employed by the TSP
- central system of the TSP which could influence the overall availability and performance of the AutoPASS services

The TSP is responsible for the:

- nomination of a test team, including an internal test manager to participate in testing
- nomination of a system responsible with sufficient knowledge about the system under test
- provision of sufficient test resources to meet the test schedule agreed in test plan
- documenting the test results including test protocols and proof documents
- reporting the results to Test Manager
- recruiting of test users for the trial period. During the trial period, the recruited test users will be responsible for following the instructions received from their TSP regarding the trial period including giving feedback to the TSP as requested.

3.4.5 NPRA / Appointed party (AP) / AutoPASS HUB/IP

The AutoPASS HUB is the central cluster equipment of the TCs and is therefore considered a part of the TC role. AutoPASS IP is also a vital common system for all actors as all data are processed in this system. The AutoPASS HUB, AutoPASS IP and other national systems are operated in a

common infrastructure (operating platform) by an “Appointed party” which reports to the test team during testing. NPRA administrates the contract with the Appointed party and will also be responsible for their tasks in the tests.

The NPRA will be in charge of performing any tests (possible by using an Appointed party) regarding:

- communication interfaces of the data exchange (e.g. VPN connection) to and from AutoPASS HUB and AutoPASS IP
- data formats of the back-office data exchange interfaces to/from the actors (TC/TSP)
- security for the interfaces or equipment employed by the TSP
- AutoPASS HUB and AutoPASS IP (including operating system, database and application ...)
- all other operational issues for the systems included in the common operational technical platform

The NPRA (possible by using an Appointed party) is responsible for the:

- nomination of a test team to participate in testing
- nomination of a system responsible with sufficient knowledge about the system under test
- provision of sufficient test resources to meet the test schedule agreed in test plan
- documenting their parts of the test results including test protocols and proof documents
- reporting the results to central test leader

3.5 TEST PREPARATION AND EXECUTION

When a test plan is approved it is necessary to commit the parties involved to the approved test plan. The applicant must enter into a test agreement with all involved actors in the test run where there is a need for such an agreement. The test agreement will regulate the provision of test resources and access to such resources.

During test preparation and execution, the test administration roles are responsible for:

- nomination of a Test Manager
- definition of a detailed test schedule for all involved actors
- production of detailed test procedures including approval criteria
 - the test procedures are to be saved in the agreed tool and can be used by the Test Manager for appropriate test levels and test types. That means the test procedures must be written so that non-technical people can use them.
 - the test procedures shall include step-by-step descriptions.
 - test data should be in place before the test procedures are complete.
- supervision of the test progress and reporting it as described in test plan
- checking the quality of the test documentation
- verification of the test results of each test and reporting it as described in test plan
- handles deviations and decides on further action.
- reporting of any topics it cannot solve to the NPRA/AutoPASS Forum, if necessary
- monitor deviations (bugs, change proposals etc.) in the test tool and classify these according to agreed categorisation. Deviations shall be classified according to type of deviation and criticality, se sec. 3.11.
- monitor that bugs will be fixed and the corrected software will be made available. The tester will then test the bug-fix. Regression of other functionality will be performed as necessary.

The processes for test preparation and execution are described in detail in “Prosessbeskrivelser i test til kvalitetssystemet” (ref.[11]).

3.6 TEST TRACKING TOOL

For major changes it is recommended that a test tracking and bug tracking tool is used, either Jira or Confluence. Minor changes can be tested/documentated without the use of such a tool.

3.7 TEST APPROACH

- No development / test objects should be without a reference number in the test tool.
- There should only be one task per task-number, with or without sub-task(s).
- All documentation must exist in the test tool case, either as an attachment or link.
- Conclusions of relevant discussions are reflected in the case.
- E-mail discussions about issues will generally not occur - use the comments in the case within the test tool.
- Statuses and resolutions in the test tool must always be updated.
- All bug reports should include step-by-step instructions on how to reproduce this issue, and preferably with screenshots.

3.8 TEST ENTRY CRITERIA

Before the test may commence the following general entry criteria shall be met:

1. The applicant has confirmed and documented conformity to AutoPASS requirement specifications
2. Previous test phases (“local” tests internal for the actor) have been successfully passed.
3. The Test Plan has been approved
4. The test platform(s) have been prepared according to specifications.
5. Test resources, accesses and artifacts must be prepared and ready.
6. If needed, required training activities have been successfully completed.
7. All test procedures have been approved.
8. All software and hardware version numbers for the test system have been recorded as baseline.
9. Necessary test data have been prepared and uploaded to the appropriate environments.
10. Test agreements have been written with all involved actors

3.9 TEST EXIT CRITERIA

Before a test may be signed off the following general exit criteria shall be met:

1. The testing is finalized, which may have as a result that the agreed acceptance criteria are passed.
2. The hardware and software version numbers of the test system are unchanged from the baseline unless changes have been approved by the NPRAs Test Manager.
3. The Error Correction Plan for reported class C deviations has been approved.
4. The Test Report has been approved.

3.10 TEST REPORT

Test report(s) shall be compiled and written by the test coordinator. Sufficient detailed test documentation shall be included to enable the test manager to approve the report. The Test report shall have this content:

- Purpose of the test
- Reference to the test script/procedure
- Data collection and sample
- Compliance to the Requirement specification
- Analysis
- Conclusions
- Appendices: Detailed data and statistics

When providing a test report, each test shall be identified by a name and a number.

The following table identifying the test and the reported result shall be applied.

Test name	Each test shall be identified by a name and a number	No.:
Description	Describe purpose and what to be tested	
Precondition	Describe the preparations, the test setup and the preconditions to be met prior to the test	
Expected result	Describe expected type of result and how this should be expressed (proof of result) Acceptance criteria cannot be defined on a general level and shall be defined for each test setup.	
Actual result	Write the actual result of the test	
Test status	State the status of the test. AutoPASS test status levels: I. Not started II. In progress III. Local test failed IV. Local test passed V. NPRA rejection of test report VI. NPRA approval of test report	
Deviations	State the deviation if a test failed	
Comment	Give a comment when appropriate for a passed test and always when a test has failed	

Table 5 – Test reporting

3.11 DEVIATIONS

During execution of the tests, deviations (i.e. errors or failure to meet the requirements) may be encountered. Deviations will be classified into a severity class and dealt with as follows:

Severity class	Definition	Action
A	The deviation needs to be corrected before tests can continue	After correction, the concerned tests are repeated
B	The deviation may be corrected by changing: a) The requirement, and/ or b) The test procedure	ad a) The assessment of the consequences of the change in requirement is done by the actor and is documented in the test report ad b) The test procedure is changed, the test is executed in accordance with the new procedure, and the change is

Severity class	Definition	Action
		logged in the test report (Applicable only in case of changed requirements or if test procedure is defined imperfect)
C	Deviation with minor consequences which can be: a) Accepted, or b) Corrected at a later stage	The evaluation of the deviation is done by the test coordinator and is documented in the test report along with the possible corrective actions.

Table 6 – Categorisation of errors and deviations

Categorization of the deviations is done by the test coordinator in cooperation with the system responsible. The test report shall not be approved by the test manager if there are deviations of severity class "A" or "B".

All class A deviations shall be corrected and the test repeated.

The requirements or test procedure shall be corrected for all class B deviations and the tests shall be repeated.

Remaining class C deviations shall be included in an action plan (including responsible part for corrections, retesting and a time schedule) prior to AutoPASS approval of the test report.

4 APPENDIX 1 – PROCESSES TO BE TESTED DURING E2E TEST

The table below shows the AutoPASS processes defined by EasyGo doc. 403 “EasyGo processes, ref.[10]. The column “Participation in process” shows who is involved in each process and therefore needs to take part in the tests. The entity which normally initiates the process is marked in yellow. Not all processes require technical testing and the column “Test” indicates which processes should be tested as part of E2E tests.

	Chapter	AutoPASS processes	Participation in process					Test
			SU	TC	AutoPASS HUB	TSP	NPRA	
Preconditions	4.1	Add new TC *		X	X	X	X	
	4.2	Add new TSP *		X	X	X	X	
	4.3	Originate EFC context data		X	X	X	X	X
	4.4	Exchange of trust objects **		X	X	X		
	4.5	Open a contract	X			X		X
	4.6	Distribute validation data		X	X	X		X
Operation	5.1	Data exchange RSE – OBE	X	X		X		X
	5.2	TC (RSE) generates transactions (C1 – C8)	X	X		X		X
	5.3	AutoPASS IP (on behalf of TC) reports billing details to TSP		X	X	X		X
	5.4	TC claims payment from TSP for service usage *		X		X		
	5.5	TSP claims payment from SU for service usage	X			X		X
	5.6	TSP claims issuer fee from TC *		X		X		
	5.7	Change contract data	X			X		X
	5.8	Exchange OBE	X			X		X
	5.9	Close contract	X			X		X
	5.10	Handle customer relations	X	X		X		
	5.11	KPI management ***		X	X	X	X	
Changes	6.1	Handle change request *		X	X	X	X	
	6.2	New equipment/updates by TC, TSP or in AutoPASS infrastructure		X	X	X	X	X
	6.3	Termination of operation by TC or TSP *		X	X	X	X	

*Includes mostly administrative processes which do not require technical testing.

**Exchange of security keys is done bilaterally and does not involve technical testing. Testing of functionality of security keys is done as part of process 5.1

***KPI procedures not part of technical testing, but should be used during trial operation

Table 7 - AutoPASS processes

5 APPENDIX 2 – CHECK LISTS TEMPLATE

May be used as a template. Responsibility column to be filled out when check list agreed

5.1 NEW TOLL CHARGER

Type of event/project/change:	Inclusion of a new AutoPASS TC (General party/Limited party/Service recipient)				
Main steps	Check list per step	Responsibility	Prelim. dates	Actual dates	Confirm action
Application requirements	<ul style="list-style-type: none"> Formal application Toll Domain Statement / description of toll domain Description of organisation / applicant Final accounts last year Traffic volumes Fee structure 				
Information on «Event / change»	<ul style="list-style-type: none"> Application from TC received by NPRA NPRA clarify issues if required Executive officer (NPRA) prepare recommendation for NPRA Application/recommendation put to NPRA for approval 				
Decision	<ul style="list-style-type: none"> NPRA approves application and mandates Executive officer (NPRA) to proceed Contractual documents prepared and sent to new TC for signature Event / project included in “overview of local projects” 				
Overall plan	<ul style="list-style-type: none"> Description of change/project (as basis for deciding what is required by AutoPASS organisations) Define who needs to be involved (and in what way) Identify main contact person(s)/roles at all relevant involved parties Prepare preliminary overall plan for project/change Get approval on overall plan from all involved parties Update list of all involved organizations Submit overall plan to NPRA 				
Test plan	<ul style="list-style-type: none"> Overall plan received Prepare detailed test plan (CS and RSE) 				

	<ul style="list-style-type: none"> • Detailed tests to be performed including approval criteria for each of INT1, INT2 and E2E • Preliminary plan for trial operation • Prerequisites for testing (See below) • Appoint personnel / roles / responsibilities • Time schedule • Detailed test plan agreed by all involved parties) • Agreed plan distributed to all involved parties plus 				
Prerequisites	<ul style="list-style-type: none"> • TC confirms FAT/SAT on RSE and CS carried out and approved • TC confirm reception of OBE from all TSPs • Identification of processes to be tested in E2E tests: <ul style="list-style-type: none"> • AutoPASS processes • Local TC processes • Special TSP processes • Identification and availability of personnel required to take part in testing at all involved parties • The time line of the tests needs to reflect data/information exchange between TC and TSP. Example: When the TC sends TIF files to the TSP, he can agree with the TSP to handle it immediately to avoid the waiting times of the normal schedule for TIF/TIC files. • Test tracking tool used for INT1, INT2, and E2E tests • Confirm all prerequisites fulfilled 				
INT1 (OBE-RSE-CS _{TC} -AutoPASS HUB)	<ul style="list-style-type: none"> • Set up new TC in AutoPASS HUB • Select test cases • Test CS – AutoPASS HUB data exchange • Test OBE – RSE – CS_{TC} transaction generation • Test OBE – RSE – CS_{TC} – AutoPASS HUB transaction generation • Approval criteria: everything works / passed • Documentation of performed and approved INT1 test 				

	<ul style="list-style-type: none"> • Reporting to Test Manager: <ul style="list-style-type: none"> • Activity started • Regular status with description of deviations and corrective actions • Activity finalised 				
INT2 (OBE-RSE-CS _{TC} -AutoPASS HUB-CS _{TSP})	<ul style="list-style-type: none"> • Test OBE-RSE- CS_{TC}-AutoPASS HUB- CS_{TSP} • All types of files • Select test cases available in Test tracking tool • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved INT2 test • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Regular status with description of deviations and corrective actions • Activity finalized 				
E2E – Test environment	<ul style="list-style-type: none"> • OBE-RSE- CS_{TC}-AutoPASS HUB-CS_{TSP} – SU • Confirm test facilities for the TC • Select test cases available in Test tracking tool • Perform tests of all processes • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved E2E test in test environment • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Regular status with description of deviations and corrective actions • Activity finalized • When approved – shift to production environment 				
E2E – Production environment	<ul style="list-style-type: none"> • Same as above but in production environment • Select test cases available in Test tracking tool • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved E2E test in production environment • Report to Test Manager <ul style="list-style-type: none"> • Activity started 				

	<ul style="list-style-type: none"> • Regular status with description of deviations and corrective actions • Activity finalized 				
Trial operation	<ul style="list-style-type: none"> • Tests means verification of selected KPIs • Detailed plan should be made well in advance of the trial operation and include: <ul style="list-style-type: none"> • Requirements for trial operation proposed by new TC and will depend if one small new TC or country etc. • Choice of KPIs to monitor specifically during trial operation • Recruitment and “education” of test users • Approval criteria’s to be defined by new TC in dialogue with AutoPASS (Toll Domain Statement) • Formal approval before regular operation (Everybody involved agree) • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Regular status with description of deviations and corrective actions 				
Final approval	<ul style="list-style-type: none"> • Test Manager confirms (to NPRA) that all tests have been performed and approved • NPRA informs all involved parties that the new TC is approved for regular operation • Formal list of actors in AutoPASS (including AutoPASS.com and intranet) are updated accordingly 				

5.2 NEW TOLL SERVICE PROVIDER

Type of event/project/change:	Inclusion of a new AutoPASS TSP or Service Recipient				
Main steps	Check list per step	Responsibility	Prelim. dates	Actual dates	Confirm action
Application requirements	<ul style="list-style-type: none"> Formal application Toll Domain Statement / description of toll domain Description of organization / applicant Final accounts last year 				
Information on «Event / change»	<ul style="list-style-type: none"> Application from TSP received by NPRA NPRA clarify issues if required Executive officer (NPRA) prepare recommendation for NPRA Application/recommendation put to NPRA for approval 				
Decision	<ul style="list-style-type: none"> NPRA approves application and mandates Executive officer (NPRA) to proceed Contractual documents prepared and sent to new TSP for signature Event / project included in “overview of local projects” 				
Overall plan	<ul style="list-style-type: none"> Description of change/project (as basis for deciding what is required by AutoPASS organization’s) Define who needs to be involved (and in what way) TCs to take part in tests identified and available Identify contact persons (roles) at all involved parties Prepare overall plan for project/change Get approval on overall plan <ul style="list-style-type: none"> from all involved parties from NPRA Update list of all involved organizations Submit overall plan to NPRA 				
Test plan	<ul style="list-style-type: none"> Template Test Plan sent TSP from NPRA Overall plan received from TSP Prepare detailed test plan (CS and OBE) <ul style="list-style-type: none"> Detailed tests to be performed including approval criteria for each of INT1, INT2 and E2E Preliminary plan for trial operation Appoint personnel / roles / responsibilities <ul style="list-style-type: none"> Time schedule Detailed test plan agreed in NPRA (incl. all involved parties) Agreed plan distributed to all involved parties 				
Prerequisites	<ul style="list-style-type: none"> TSP confirm: 				

Type of event/project/change:	Inclusion of a new AutoPASS TSP or Service Recipient				
Main steps	Check list per step	Responsibility	Prelim. dates	Actual dates	Confirm action
	<ul style="list-style-type: none"> • Certification of OBE and FAT/SAT on CS carried out and approved • All relevant local TC processes identified • Identification and availability of personnel required to take part in testing at all involved parties • Test tracking tool used for INT1, INT2, and E2E tests • Confirm all prerequisites fulfilled 				
INT1 (CS _{TSP} -AutoPASS HUB)	<ul style="list-style-type: none"> • Set up new TSP in AutoPASS HUB • Select test cases available in Test tracking tool • Test CS – AutoPASS HUB data exchange • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved INT1 test • Report to Test Manager: <ul style="list-style-type: none"> • Activity started • Status with deviations and corrective actions • Activity finalized 				
INT2 (OBE-RSE-CS _{TC} -AutoPASS HUB-CS _{TSP})	<ul style="list-style-type: none"> • Test OBE-RSE- CS_{TC} -AutoPASS HUB- CS_{TSP} • All types of files • Select test cases available in Test tracking tool • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved INT2 test • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Status with deviations and corrective actions • Activity finalized 				
E2E – Test environment	<ul style="list-style-type: none"> • OBE-RSE- CS_{TC}-AutoPASS HUB- CS_{TSP} – SU • Confirm test facilities for the TSP • Select test cases available in Test tracking tool • Perform tests of all processes • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved E2E test in test environment • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Status with deviations and corrective actions 				

Type of event/project/change:	Inclusion of a new AutoPASS TSP or Service Recipient				
Main steps	Check list per step	Responsibility	Prelim. dates	Actual dates	Confirm action
	<ul style="list-style-type: none"> Activity finalized When approved – shift to production environment 				
E2E – Production environment	<ul style="list-style-type: none"> Same as above but in production environment Select test cases available in Test tracking tool Approval criteria: everything works / passed in Test tracking tool Documentation of performed and approved E2E test in production environment Report to Test Manager <ul style="list-style-type: none"> Activity started Status with deviations and corrective actions Activity finalized 				
Trial operation	<ul style="list-style-type: none"> Tests means verification of selected KPIs Detailed plan should be made well in advance of the trial operation and include: <ul style="list-style-type: none"> Requirements for trial operation proposed by new TSP Choice of KPIs to monitor specifically during trial operation Recruitment and “education” of test users Approval criteria’s to be defined by new TSP in dialogue with AutoPASS Formal approval before regular operation (Everybody involved agree) Report to Test Manager <ul style="list-style-type: none"> Activity started Status with deviations and corrective actions 				
Final approval	<ul style="list-style-type: none"> Test Manager confirms (to NPRA) that all tests have been performed and approved NPRA informs all involved parties that the new TC is approved for regular operation Formal list of actors in AutoPASS (including AutoPASS.com and intranet) are updated accordingly 				

5.3 NEW TYPE OF OBE

Type of event/project/change:	Inclusion of new type of OBE by AutoPASS TSP or Service Recipient				
Main steps	Check list per step	Responsibility	Prelim. dates	Actual dates	Confirm action
Application requirements	<ul style="list-style-type: none"> An AutoPASS TSP does not have to apply to AutoPASS to introduce a new type of OBE. He does, however, have to provide certification of the new type of OBE 				
Information on «Event / change»	<ul style="list-style-type: none"> The TSP should inform NPRA about the new OBE as early as possible and at least six months prior to introduction to users 				
Decision	<ul style="list-style-type: none"> Event included in “overview of local projects” 				
Overall plan	<ul style="list-style-type: none"> Description of change/project (as basis for deciding what is required by AutoPASS organizations) Define who needs to be involved (and in what way) Identify contact persons (roles) at all involved parties Prepare overall plan for project/change Get approval on overall plan from all involved parties Update list of OBE types (AIT-list) with status Submit overall plan to all involved parties 				
Test plan	<ul style="list-style-type: none"> Overall plan received from TSP Prepare detailed test plan <ul style="list-style-type: none"> Detailed tests to be performed including approval criteria for each of INT1, INT2 and E2E Preliminary plan for trial operation Appoint personnel / roles / responsibilities Time schedule Detailed test plan agreed in all involved parties Agreed plan distributed to all involved parties 				
Prerequisites	<ul style="list-style-type: none"> TSP confirm certification of OBE provided TCs to take part in tests identified and available 				

Type of event/project/change:	Inclusion of new type of OBE by AutoPASS TSP or Service Recipient				
Main steps	Check list per step	Responsibility	Prelim. dates	Actual dates	Confirm action
	<ul style="list-style-type: none"> • Identification and availability of personnel required to take part in testing at all involved parties • Test tracking tool used for INT1, INT2, and E2E tests • Confirm all prerequisites fulfilled 				
INT1 (OBE-RSE-CS _{TC} -AutoPASS HUB)	<ul style="list-style-type: none"> • Set up new TSP in AutoPASS HUB • Select test cases available in Test tracking tool • Test CS – AutoPASS HUB data exchange • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved INT1 test • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Status with deviations and corrective actions • Activity finalized 				
INT2 (OBE-RSE-CS _{TC} -AutoPASS HUB-CS _{TSP})	<ul style="list-style-type: none"> • Test OBE-RSE- CS_{TC}-AutoPASS HUB-CS_{TSP} • All types of files • Select test cases available in Test tracking tool • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved INT2 test • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Status with deviations and corrective actions • Activity finalized 				
E2E – Test environment	<ul style="list-style-type: none"> • OBE-RSE- CS_{TC}-AutoPASS HUB- CS_{TSP} – SU • Confirm test facilities for the TSP • Select test cases available in Test tracking tool • Perform tests of all processes • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved E2E test in test environment • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Status with deviations and corrective actions • Activity finalized • When approved – shift to production environment 				

Type of event/project/change:	Inclusion of new type of OBE by AutoPASS TSP or Service Recipient				
Main steps	Check list per step	Responsibility	Prelim. dates	Actual dates	Confirm action
E2E – Production environment	<ul style="list-style-type: none"> • Same as above but in production environment • Select test cases available in Test tracking tool • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved E2E test in production environment • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Status with deviations and corrective actions • Activity finalized 				
Trial operation	<ul style="list-style-type: none"> • Tests means verification of selected KPIs • Detailed plan should be made well in advance of the trial operation and include: <ul style="list-style-type: none"> • Requirements for trial operation proposed by new TSP • Choice of KPIs to monitor specifically during trial operation • Recruitment and “education” of test users • Approval criteria’s to be defined by new TSP in dialogue with AutoPASS • Formal approval before regular operation (Everybody involved agree) • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Status with deviations and corrective actions 				
Final approval	<ul style="list-style-type: none"> • Test Manager confirms (to NPRA) that all tests have been performed and approved • NPRA informs all involved parties that the new OBE is approved for regular operation 				

5.4 NEW EQUIPMENT/UPDATES BY TC, TSP OR IN AUTOPASS INFRASTRUCTURE

Type of event/project/change:	New equipment/updates by TC, TSP or in AutoPASS infrastructure				
Main steps	Check list per step	Responsibility	Prelim. dates	Actual dates	Confirm action
Information on «Event / change»	<ul style="list-style-type: none"> Application from TC received by NPRA NPRA clarifies issues if required Executive officer (NPRA) prepare recommendation for NPRA Application/recommendation put to NPRA for approval 				
Decision	<ul style="list-style-type: none"> A proposal for change of AutoPASS HUB is made by NPRA or by any AutoPASS party or TSP NPRA prepares a recommendation describing the change, the costs and an implementation plan AutoPASS Forum discusses the change and concludes Event / project included in “overview of local projects” 				
Overall plan	<ul style="list-style-type: none"> Description of change/project (as basis for deciding what is required by AutoPASS organizations) Information to all parties Define who needs to be involved (and in what way) Identify main contact person(s)/roles at all relevant involved parties Prepare preliminary overall plan for project/change Get approval on overall plan from all involved parties Submit overall plan to all involved parties 				
Test plan	<ul style="list-style-type: none"> Overall plan received from NPRA Prepare detailed test plan <ul style="list-style-type: none"> Detailed tests to be performed including approval criteria for each of INT1, INT2 and E2E Preliminary plan for trial operation Prerequisites for testing (See below) Appoint personnel / roles / responsibilities Time schedule Detailed test plan agreed in all involved parties Agreed plan distributed to all involved parties 				
Prerequisites	<ul style="list-style-type: none"> Identification of processes to be tested in E2E tests: 				

Type of event/project/change:	New equipment/updates by TC, TSP or in AutoPASS infrastructure				
Main steps	Check list per step	Respons- ibility	Prelim. dates	Actual dates	Confirm action
	<ul style="list-style-type: none"> • AutoPASS processes • Local TC processes • Special TSP processes • Identification and availability of personnel required to take part in testing at all involved parties • Test tracking tool used for INT1, INT2, and E2E tests • Confirm all prerequisites fulfilled 				
INT1 (OBE-RSE-CS _{TC} - AutoPASS HUB)	<ul style="list-style-type: none"> • Select test cases available in Test tracking tool • Test CS – AutoPASS HUB data exchange • Test OBE – RSE – CS_{TC} – AutoPASS HUB transaction generation • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved INT1 test • Reporting to Test Manager: <ul style="list-style-type: none"> • Activity started • Regular status with description of deviations and corrective actions • Activity finalized 				
INT2 (OBE-RSE-CSTC- AutoPASS HUB-CS _{TSP})	<ul style="list-style-type: none"> • Test OBE-RSE- CS_{TC}-AutoPASS HUB- CS_{TSP} • All / relevant types of files • Select test cases available in Test tracking tool • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved INT2 test • Report to EM <ul style="list-style-type: none"> • Activity started • Regular status with description of deviations and corrective actions • Activity finalized 				
E2E – Test environment	<ul style="list-style-type: none"> • OBE-RSE-CS_{TC}-AutoPASS HUB-CS_{TSP} – SU • Confirm test facilities • Select test cases available in Test tracking tool • Perform tests of all/relevant processes • Approval criteria: everything works / passed in Test tracking tool 				

Type of event/project/change:	New equipment/updates by TC, TSP or in AutoPASS infrastructure				
Main steps	Check list per step	Respons-ibility	Prelim. dates	Actual dates	Confirm action
	<ul style="list-style-type: none"> • Documentation of performed and approved E2E test in test environment • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Regular status with description of deviations and corrective actions • Activity finalized • When approved – shift to production environment 				
E2E – Production environment	<ul style="list-style-type: none"> • Same as above but in production environment • Select test cases available in Test tracking tool • Approval criteria: everything works / passed in Test tracking tool • Documentation of performed and approved E2E test in production environment • Report to Test Manager <ul style="list-style-type: none"> • Activity started • Regular status with description of deviations and corrective actions • Activity finalized 				
Trial operation	<ul style="list-style-type: none"> • Tests means verification of selected KPIs • Detailed plan should be made well in advance of the trial operation and include: <ul style="list-style-type: none"> • Requirements for trial operation proposed by AP • Choice of KPIs to monitor specifically during trial operation • Recruitment and “education” of test users • Approval criteria’s to be defined • Formal approval before regular operation (Everybody involved agree) • Report to Test Manager <ul style="list-style-type: none"> ○ Activity started ○ Regular status with description of deviations and corrective actions 				
Final approval	<ul style="list-style-type: none"> • Test Manager that all tests have been performed and approved • NPRA informs all involved parties that the new functionality is operational 				

Type of event/project/change:	New equipment/updates by TC, TSP or in AutoPASS infrastructure				
Main steps	Check list per step	Respons- ibility	Prelim. dates	Actual dates	Confirm action
	<ul style="list-style-type: none"> Relevant documents are updated 				