Train Control
ETCS system ETCS 1

ETCS System Compatibility Test Description

Document Management

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T. Destrée	1.1 draft 2	9/12/20202		Review comments.
T. Destrée	1.1	11/12/2929		Major version
T. Destrée	1.2 draft 1	1/02/2021	§3	Correct name of the test case L1FS_3
			§4.10	Update to clarify test case ESC_L1FS_8.
		2/07/2021	Test cases ESC_TR_12, ESC_TR_15	Test cases adapted for trains without TBL1+ STM.
T. Destrée	1.2 draft 2	10/6/2021	Test cases ESC_TR_5, ESC_TR_7.1, ESC_TR_7.2	Transitions with TVM
T. Destrée	1.2	8/09/2021		Integration of review comments and major version.
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T. Destrée	1.4 draft 1	12/09/2022	ESC_L1FS_5 ESC_L1FS_3	Minor correction in "Description" cell. Test case deleted
T. Destrée	1.4	7/11/2022	§1.2 §3	New version of the TST PLN ESC_L1FS_3 deleted. Major version
T. Destrée	1.5	16/11/2022	§1.2 §4.8.1 §4.15.2 §4.10	New version of [1]. Minor change in Starting conditions. P46 removed from the Figure. Testcase ESC_L1FS_8 deleted.
T. Destrée	1.6 draft 1	28/09/2023	4.1 4.12, 4.13, 4.15	Confidentiality clause modified. Tests ESC_L1FS_1 deleted. Implementation of CR1166 taken into account in ESC_TR_7.1, ESC_TR_7.2 and ESC_TR_15.
T. Destrée	1.6	21/03/2024	4.12, 4.13, 4.15	standardisation of the structure of tests modified by the CR1166 Major version.

Abrogated documents

Name	Version	Date

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Table of Contents

1. INTRODUCTION 4
1.1 PURPOSE OF THE DOCUMENT 4
1.2 BASIC DOCUMENTS 4
1.3 REFERENCE DOCUMENTS 4
1.4 ANNEXES 4
1.5 SCOPE 4
1.6 DEFINITIONS, SYMBOLS AND ABBREVIATIONS 4
1.7 KNOWN IMPERFECTIONS 5
2. ON-BOARD EQUIPMENT 5
3. FUNCTIONALITIES 6
4. TEST SCENARIOS 7
4.1 TEST ESC_L1FS_1: INTENTIONALLY DELETED 7
4.2 TEST ESC_L1FS_2: IREPOS 7
4.2.1 Description 7
4.2.2 Scenario diagram 9
4.3 TEST ESC_L1FS_2_PART 2: IREPOS 10
4.3.1 Description 10
4.3.2 Scenario diagram 11
4.5 TEST ESC_L1FS_3 : INTENTIONALLY DELETED 12
4.6 TEST ESC_L1FS_4: CROSSING CLOSED NON-PERMISSIVE SIGNAL WITHOUT OVERRIDE 12
4.6.1 Description 12
4.6.2 Scenario diagram 13
4.7 TEST ESC_L1FS_5: CROSSING CLOSED NON-PERMISSIVE SIGNAL WITH OVERRIDE 14
4.7.1 Description 14
4.7.2 Scenario diagram 15
4.8 TEST ESC_L1FS_6: CROSSING A CLOSED PERMISSIVE SIGNAL 16
4.8.1 Description 16
4.8.2 Scenario diagram 17
4.9 TEST ESC_L1FS_7 : CR819 18
4.9.1 Description 18
4.9.2 Scenario diagram 18
4.10 TEST ESC_L1FS_8: INTENTIONALLY DELETED 19
4.11 TEST ESC_TR_5 : TRANSITION LEVEL 1 FS TO TVM430 19
4.11.1 Description 19
4.11.2 Scenario diagram 20
4.12 TEST ESC_TR_7.1: TRANSITION TVM430 TO LEVEL 1 FS 21
4.12.1 Description 21
4.12.2 Scenario diagram 22
4.13 TEST ESC_TR_7.2: TRANSITION TVM430 TO LEVEL 1 FS 23
4.13.1 Description 23
4.13.2 Scenario diagram 24
4.14 TEST ESC_TR_12: TRANSITION ETCS1 FS TO STM TBL1+ 25
4.14.1 Description 25
4.14.2 Scenario diagram 26
4.15 TEST ESC_TR_15: TRANSITION STM TBL1+ TO ETCS1 FS 27
4.15.1 Description 27
4.15.2 Scenario diagram 28

1. Introduction

1.1 Purpose of the document

The purpose of this document is to define the test scenarios to perform in order to prove the ETCS System Compatibility (ESC) between the trackside ETCS Level 1 with system version 1.Y and the On-board.
The tests scenarios describe more in detail each “high level” scenarios defined in the ESC test plan [1].
The success of these test scenarios shall prove the technical compatibility between ETCS On-board and the Trackside part ETCS of the CCS subsystems within the ETCS1 with system version 1.Y area on Infrabel conventional network.

The technical specification for interoperability used inside an ETCS1 with system version 1.Y area on Infrabel network is the set of specifications 1, B2 (Cfr [2] and [3]).

These test scenarios for ETCS system compatibility do not cover all design rules used in an ETCS1 area. If required, Infrabel can provide additional operational test scenarios performed during the verification that the trackside subsystem complies with the requirement of the TSI.

In case of doubt concerning the ESC of the board with the trackside, the railway undertaking shall take the required action with his supplier and inform Infrabel.

1.2 Basic documents

Ref.	*Title*	*Owner*
[1]	PSI (TC,ETCSsys,z) ESC TST PLN 1.8	Infrabel

1.3 Reference documents

Ref.	*Title*	*Owner*
[2]	Commission Decision (EU) 2012/88/EU of 25 January 2012	UE
[3]	Commission Decision (EU) 2012/696/EU of 6 November 2012	UE
[4]	PSI(TP,ETCSsys.L1LS.z) ESC TST DSC	Infrabel
[5]	PSI(TC,ETCSsys.L2,z) ESC TST DSC	Infrabel

1.4 Annexes

Ref.	*Title*	*Owner*
[6]	None	

1.5 Scope

This document is applicable for all trains would run under the protection of ETCS level 1 in an ETCS1 with system version 1.Y area on the Infrabel conventional network.

1.6 Definitions, symbols and abbreviations

CCS	Control Command System
DMI	Driver Machine Interface
ESC	ETCS System Compatibility
ETCS	European Train Control System
IBG	Infill Balise Group
LS	Limited Supervision
NR	Not Relevant
SBG	Signal Balise Group
TSI	Technical Specification for Interoperability

1.7 *Known imperfections*

None

2. On-board Equipment

Out of scope of railway manager Infrabel.

3. Functionalities

The tested functionalities are described in the table here under:

Test scenario (ref ESC TST PLN [1])	Tested functionality
ESC_L1FS_1	Test case deleted
ESC_L1FS_2	IREPOS
ESC_L1FS_3	Test case deleted
ESC_L1FS_4	Crossing closed non-permissive signal without override
ESC_L1FS_5	Crossing closed non-permissive signal with override
ESC_L1FS_6	Crossing a closed permissive signal
ESC_L1FS_7	CR819
ESC_L1FS_8	Test case deleted
ESC_TR_1	*ETCS 1 FS >> ETCS 1 LS (out of scope of this document)*
ESC_TR_3	*ETCS 1 LS >> ETCS 1 FS (out of scope of this document)*
ESC_TR_5	ETCS 1FS >> TVM430
ESC_TR_7	TVM430 >> ETCS 1FS
ESC_TR_9	*ETCS1 FS >> ETCS 2 FS (out of scope of this document)*
ESC_TR_10	*ETCS 2 FS >> ETCS 1 FS (out of scope of this document)*
ESC_TR_12	ETCS 1 FS >> STM TBL1+
ESC_TR_15	STM TBL1+ >> ETCS 1 FS

The document will only describe the sequences to perform the scenarios but not all the actions to prepare the execution of the test scenarios.

Transitions to and from ETCS1 Limited supervision (ESC_TR_1 and ESC_TR_3) are covered in the ESC test DSC for ETCS1 LS program (cf. [4]).
Transitions to and from ETCS Level 2 (ESC_TR_9 and ESC_TR_10) are covered in the ESC test DSC for ETCS2 program (cf. [5]).

4. Test scenarios

4.1 *Test ESC_L1FS_1: Intentionally deleted*

4.2 *Test ESC_L1FS_2: IREPOS*

4.2.1 Description

ID	Date	Location / Line
ESC_L1FS_2	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : • Test ESC_L1FS_2: IREPOS The section between signals S1 and S2 is a regrouped section. The itinerary passing by track <track number> (track A) is the longest itinerary of the regrouped itineraries. The IREPOS BG (<NID_C NID_BG>) sends IREPOS information <distance signal/BG>m upwards signal S1. This test can be performed in lab.	

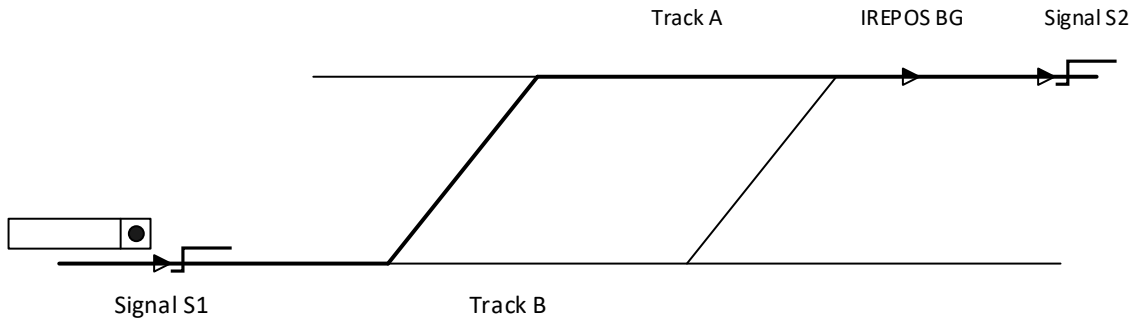
Signal passed	
Name	Trackside datafile in service
Signal S1: <signal name> is open	
Signal S2: <signal name> is closed	

Test Scenarios	
Starting condition	Train is upwards signal S1 in ETCS 1 FS.
	The route is set between S1 and S2 passing by track A.
	Be sure all authorisations are filled in before performing the test scenarios

Sequences of the test scenario				
Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes signal S1 and track A.	Passing S1, the MA has the length of the shortest itinerary to the signal S2, and the	Pass / Fail	

	Train receives IREPOS information when passing IREPOS BG.	IREPOS BG is linked with identifier “UNKNOWN”. Passing the IREPOS BG, the length of the current section is extended by <Difference of distance between regrouped routes>m.		
2	Signaller opens signal S2 then train passes signal S2.	The MA is extended downwards signal S2	Pass / Fail	
Test scenario finished				

4.2.2 Scenario diagram



Final State	Train is in level 1 FS downwards signal S2.

4.3 *Test ESC_L1FS_2_part 2: IREPOS*

4.3.1 Description

ID	Date	Location / Line
ESC_L1FS_2_part2	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : • Test ESC_L1FS_2: IREPOS The section between signals S1 and S2 is a regrouped section. The itinerary passing by track <track number> (track A) is the longest itinerary of the regrouped itineraries. The IREPOS BG (<NID_C NID_BG>) sends IREPOS information <distance signal/BG>m upwards signal S1. This test can be performed in lab.	

Signal passed	
Name	Trackside datafile in service
Signal S1: <signal name> is open	
Signal S2: <signal name> is closed	

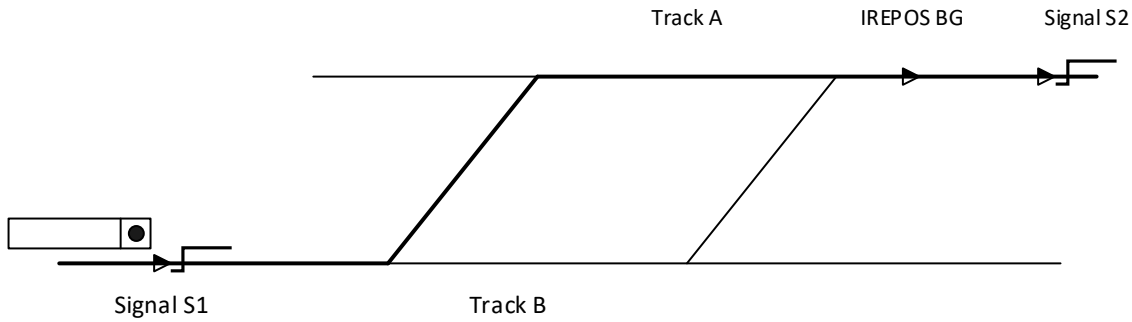
Test Scenarios	
Starting condition	Train is upwards signal S1 in ETCS 1 FS.
	The route is set between S1 and S2 passing by track A.
	Be sure all authorisations are filled in before performing the test scenarios

Sequences of the test scenario

Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes signal S1 while the signal S2 is closed.	The MA has the length of the shortest itinerary to the signal S2, and the IREPOS BG is linked with identifier “UNKNOWN”.	Pass / Fail	
2	Before the train reaches the IREPOS BG, the signal S2 is open. Train passes the IREPOS BG receiving IREPOS information.	The MA is extended beyond the signal S2 (infill information is accepted) and the length of the current section is extended by <Difference of distance between regrouped routes>m.	Pass / Fail	

Test scenario finished				

4.3.2 Scenario diagram



Final State	Train in level1 FS beyond panel P1

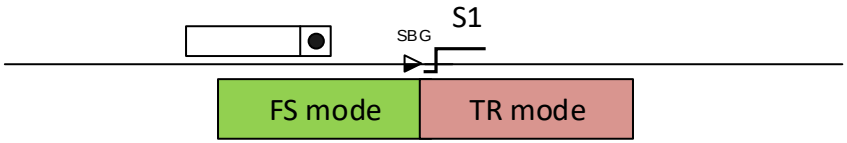
4.5 *Test ESC_L1FS_3 : Intentionally deleted*

4.6 *Test ESC_L1FS_4: Crossing closed non-permissive signal without override*

4.6.1 Description

<table>
<tr><td>ID</td><td colspan="3">Date</td><td>Location / Line</td></tr>
<tr><td>ESC_L1FS_4</td><td colspan="3"><dd/mm/yyyy></td><td><Line></td></tr>
<tr><td>Description</td><td colspan="4">Functionalities tested :
• Test ESC_L1FS_4: Crossing closed non-permissive signal without override</td></tr>
<tr><td colspan="5">Signal passed</td></tr>
<tr><td colspan="3">Name</td><td colspan="2">Trackside datafile in service</td></tr>
<tr><td colspan="3">S1 : <Signal name> is a closed-controlled main stop signal.</td><td colspan="2"></td></tr>
<tr><td colspan="3"></td><td colspan="2"></td></tr>
<tr><td colspan="5">Test Scenarios</td></tr>
<tr><td rowspan="4">Starting condition</td><td colspan="4">Train is :
• in level 1 FS mode
• at standstill upwards signal S1.</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td colspan="4"></td></tr>
<tr><td colspan="4">Be sure all authorisations are filled in before performing the test scenarios.</td></tr>
<tr><td colspan="5">Sequences of the test scenario</td></tr>
<tr><td>Step</td><td>Step description</td><td>Description of what to be tested</td><td>Statement</td><td>Comment</td></tr>
<tr><td>1</td><td>Train passes signal S1 without activation of the override. The train should be at low speed when passing the signal.</td><td>Train is tripped and emergency brakes are applied.</td><td>Pass / Fail</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Test scenario finished</td></tr>
</table>

4.6.2 Scenario diagram



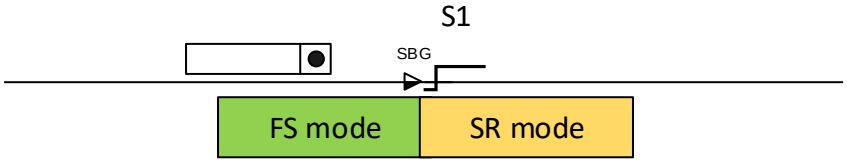
Final State	Train is in level 1 TR mode beyond signal S1.

4.7 *Test ESC_L1FS_5: Crossing closed non-permissive signal with override*

4.7.1 Description

<table>
<tr><td>ID</td><td colspan="3">Date</td><td>Location / Line</td></tr>
<tr><td>ESC_L1FS_5</td><td colspan="3"><dd/mm/yyyy></td><td><Line></td></tr>
<tr><td>Description</td><td colspan="4">Functionalities tested :
• Test ESC_L1FS_5: Crossing closed non-permissive signal with override</td></tr>
<tr><td colspan="5">Signal passed</td></tr>
<tr><td colspan="3">Name</td><td colspan="2">Trackside datafile in service</td></tr>
<tr><td colspan="3">S1 : <Signal name> is a closed-controlled main stop signal.</td><td colspan="2"></td></tr>
<tr><td colspan="3"></td><td colspan="2"></td></tr>
<tr><td colspan="5">Test Scenarios</td></tr>
<tr><td rowspan="3">Starting condition</td><td colspan="4">Train is :
• in level 1 FS mode
• at standstill upwards signal S1.</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td colspan="4">Be sure all authorisations are filled in before performing the test scenarios.</td></tr>
<tr><td colspan="5">Sequences of the test scenario</td></tr>
<tr><td>Step</td><td>Step description</td><td>Description of what to be tested</td><td>Statement</td><td>Comment</td></tr>
<tr><td>1</td><td>Train passes signal S1 at low speed after activation of the override.</td><td>Train changes to SR mode.</td><td>Pass / Fail</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Test scenario finished</td></tr>
</table>

4.7.2 Scenario diagram



Final State	Train is in level 1 SR mode beyond signal S1.

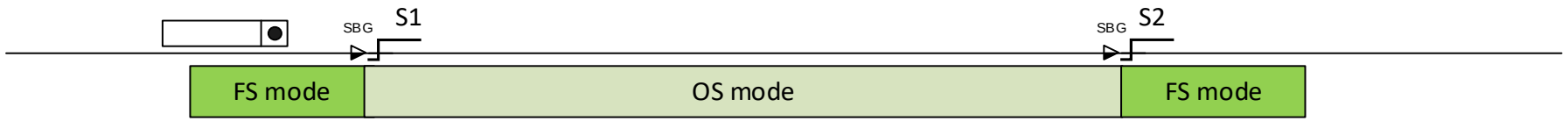
4.8 *Test ESC_L1FS_6: Crossing a closed permissive signal*

4.8.1 Description

ID	Date	Location / Line
ESC_L1FS_6	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : • Test ESC_L1FS_6: Crossing a closed permissive signal	
Signal passed		
Name	Trackside datafile in service	
S1 : <Signal name> is a closed-non controlled main stop signal.		
S2: <Signal name> is an open main stop signal. Equipped with an IBG		
Test Scenarios		
Starting condition	Train is : • in level 1 FS mode (or SR mode). • at standstill upwards signal S1.	
	Be sure all authorisations are filled in before performing the test scenarios.	

Sequences of the test scenario				
Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes signal S1 at low speed without activation of the override.	Train changes to OS mode.	Pass / Fail	
2	The train passes IBG of S2.	Train rejects the infill information.	Pass / Fail	
3	Train continues and passes S2.	Train changes to FS mode, extending the MA length.	Pass / Fail	
Test scenario finished				

4.8.2 Scenario diagram



Final State	Train is in level 1 FS mode beyond signal S2.

4.9 *Test ESC_L1FS_7 : CR819*

4.9.1 Description

ID	Date	Location / Line
ESC_L1FS_7	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_L1FS_7 : CR819 If the balises are duplicated within a balise group and a balise is not read or not decoded correctly but the duplicated balise is, then the message shall not be rejected and no linking reaction shall be applied.	
Signal passed		
Name	Trackside datafile in service	
Test Scenarios		
Starting condition	Train is in level 1 mode FS upwards a fixed balise group sending a text message.	
	A cover is installed on the first balise of the fixed BG (N_PIG = 0).	
	Be sure all authorisations are filled in before performing the test scenarios	

Sequences of the test scenario				
Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes the fixed BG	No linking reaction occurs and the text message <text send by the BG> is displayed on the DMI.	Pass / Fail	
Test scenario finished				

4.9.2 Scenario diagram

none	
Final State	Train in level 1 FS beyond fixed BG

4.10 *Test ESC_L1FS_8: Intentionally deleted*

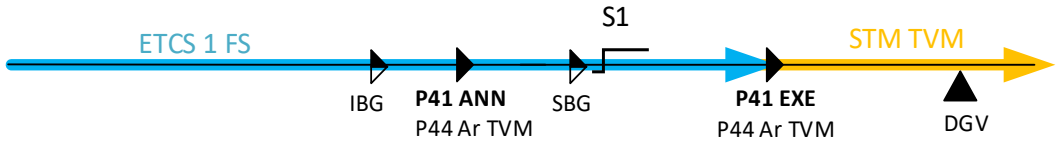
4.11 *Test ESC_TR_5 : Transition Level 1 FS to TVM430*

4.11.1 Description

ID	Date	Location / Line
ESC_TR_5	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_5: Transition Level 1 FS to TVM430. This test case is only required for trains running through line 1 (Only line equipped with TVM430 on the Infrabel network).	
Signal passed		
Name	Trackside datafile in service	
S1 : <Signal name of the last signal> is open presenting Y aspect.		
Test Scenarios		
Starting condition	Train in level 1 FS	
	All signals or marker board are at Open Proceed to permit the train to ride at full speed.	
	Be sure all authorisations are filled in before performing the test scenarios	

Sequences of the test scenario				
Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes the announcement BG of the transition.	Transition is announced on the DMI. If possible, confirm that the TVM onboard equipment switches to Hot Standby. The request for the acknowledgment of the transition is displayed.	Pass / Fail	
2	Driver acknowledges the transition. Train passes the execution BG of the transition.	Train switches to Level STM and the TVM equipment is armed after a few seconds.	Pass / Fail	
3	Train passes the KVB balise with DVG function.	The TVM onboard is activated (“contrôle d’armement” is activated), no expected reaction.	Pass / Fail	
Test scenario finished				

4.11.2 Scenario diagram



Final State	Train is supervised by TVM.

4.12 *Test ESC_TR_7.1: Transition TVM430 to Level 1 FS*

4.12.1 Description

ID	Date	Location / Line
ESC_TR_7.1	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_7: Transition TVM to ETCS1 FS This test case is only required for trains running through line 1 (Only line equipped with TVM430 on the Infrabel network).	

Signal passed	
Name	Trackside datafile in service
S1 : <Signal name of the last marker board> is open.	
S2 : <Signal name of the first signal> is open.	

Test Scenarios	
Starting condition	Train in level STM under TVM supervision
	All signals or marker board are at Open Proceed to permit the train to ride at full speed.
	Be sure all authorisations are filled in before performing the test scenarios

Sequences of the test scenario				
Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes S1 marker board and receives a MA and an immediate level transition.	Train switches to level 1 FS. If CR11666 is not implemented : The request for the acknowledgment of the transition is displayed.	Pass / Fail	
2	If CR11666 is not implemented : Driver acknowledges the transition before 5 seconds. *Otherwise*: No action of the driver required.	Train continues in level 1 FS.	Pass / Fail	
Test scenario finished				

4.12.2 Scenario diagram

Final State	Train is in level 1 FS downwards signal S2

4.13 *Test ESC_TR_7.2: Transition TVM430 to Level 1 FS*

4.13.1 Description

ID	Date	Location / Line
ESC_TR_7.2	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_7: Transition TVM to ETCS1 FS on S2 This test case is only required for trains running through line 1 (Only line equipped with TVM430 on the Infrabel network).	
Signal passed		
Name		Trackside datafile in service
S1 : <Signal name of the last marker board> is closed (with override lamp on).		
S2 : <Signal name of the first signal> is open.		
Test Scenarios		
Starting condition	Train in level STM under TVM supervision	
	The marker board S1 is closed, signal S2 is open.	
	Be sure all authorizations are filled in before performing the test scenarios	

Sequences of the test scenario				
Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes S1 marker board with override and receives no ETCS transition	Train continues in STM TVM	Pass / Fail	
2	Train passes KVB_FGV balise	“Contrôle armement” is deactivated.	Pass / Fail	
3	Train passes TVM_ESNCB loop	TVM cab signalling turns off.	Pass / Fail	
4	Train passes signal S2 and receives a MA and an immediate level transition.	Train switches to level 1 FS. If CR11666 is not implemented : The request for the acknowledgment of the transition is displayed.	Pass / Fail	
5	If CR11666 is not implemented : Driver acknowledges the transition before 5 seconds. *Otherwise*:	Train continues in level 1 FS.	Pass / Fail	

	No action of the driver required.			
Test scenario finished				

4.13.2 Scenario diagram

Final State	Train is in level 1 FS downwards signal S2

4.14 *Test ESC_TR_12: Transition ETCS1 FS to STM TBL1+*

4.14.1 Description

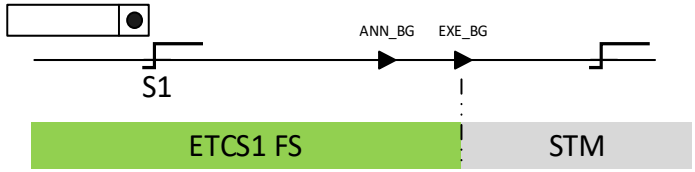
ID	Date	Location / Line
ESC_TR_12	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_12 : Transition ETCS1 FS to STM TBL1+ *Remark: if test case is executed in CVT track, a text message "=>S*" is displayed between from reception of the transition up to the first TBL1+ signal. An acknowledgment of the text message is required.*	

Signal passed	
Name	Trackside datafile in service
S1 : <Signal name> is open. It is the last ETCS1 FS signal.	

Test Scenarios	
Starting condition	Train is in level 1 mode FS upwards signal S1.
	Be sure all authorisations are filled in before performing the test scenarios

Sequences of the test scenario				
Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes signal S1 and the level transition announcement fixed BG at the reference speed of the line.	Train receives a transition execution to level STM. A level transition announcement is displayed on the DMI. Acknowledgement is possible about 5 seconds after receiving the announcement.	Pass / Fail	
2	Driver acknowledge the transition and train passes the level transition execution BG.	Train switches to level STM. The possible STM are in descending order of priority : TBL1+, TBL2, TBL1, Memor, KVB.	Pass / Fail	
Test scenario finished				

4.14.2 Scenario diagram



Final State	Train in level STM beyond the EXE_BG.

4.15 *Test ESC_TR_15: Transition STM TBL1+ to ETCS1 FS*

4.15.1 Description

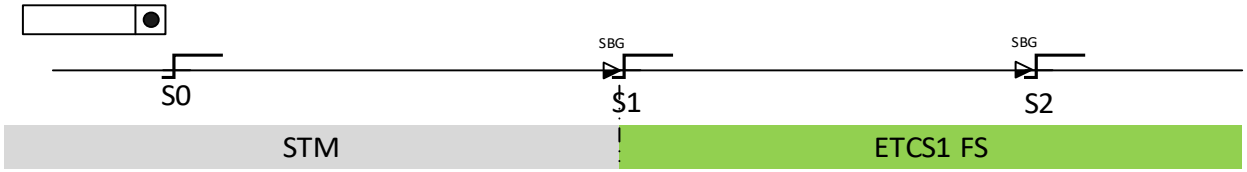
ID	Date	Location / Line
ESC_TR_15	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_15 Transition STM TBL1+ to ETCS1 FS	

Signal passed	
Name	Trackside datafile in service
S1 : <Signal name> is open. It is the first ETCS1 signal	
S2 : <Signal name> is open	

Test Scenarios	
Starting condition	Train is in level STM in rear of signal S1. The possible STM are in descending order of priority: TBL1+, TBL2, TBL1, Memor, KVB.
	Be sure all authorisations are filled in before performing the test scenarios

Sequences of the test scenario				
Step	Step description	Description of what to be tested	Statement	Comment
1	Train passes signal S1	Train switches to level 1 FS mode. If CR11666 is not implemented : The request for the acknowledgment of the transition is displayed.	Pass / Fail	
2	If CR11666 is not implemented : Driver acknowledges the transition before 5 seconds. *Otherwise*: No action of the driver required.	Train continues in level 1 FS mode.	Pass / Fail	
Test scenario finished				

4.15.2 Scenario diagram



Final State	Train is in level 1 FS beyond signal S1