Train Control
ETCS system ETCS 1

ETCS System Compatibility Test Description

Document Management

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Abrogated documents

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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 describes 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 1.2	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*

No test cases are defined for transitions from and to TVM430 in this version of the document.

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	Train categories
ESC_L1FS_2	IREPOS
ESC_L1FS_3	Stop on two consecutive sections
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	CR1120
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: Train categories*

4.1.1 Description

ID	Date	Location / Line
ESC_L2FS_1 part1	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : • Tests ESC_L1FS_1 : train categories This test does not need to be repeated with all possible categories. The train categories should not be the one associated with the lowest speed profile.	
Signal passed		
Name		Trackside datafile in service
Panel P1 at bk <bk of the speed panel> is at the beginning of a train category speed restricted area.		
Signal S1: <signal name> is closed: Signal S1 is upwards panel P1.		
Test Scenarios		
Starting condition	Track 1: track <Track number>	
	Train A • Train A is in Level 1 mode FS • Train A is in rear of signal S1 • Train category <Freight G / Freight P / Passenger> is selected on-board.	
	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	Signaller opens signal S1.	Train A receives an MA with a packet 27 including train category speed restriction.	Pass / Fail	
2	Driver starts and passes the signal S1 and panel P1.	The speed is limited at <train category max speed> km/h at panel P1.	Pass / Fail	
Test scenario finished				

4.1.2 Scenario diagram

None	
Final State	Train in level1 FS beyond panel P1

4.2 *Test ESC_L1FS_2: IREPOS*

4.2.1 Description

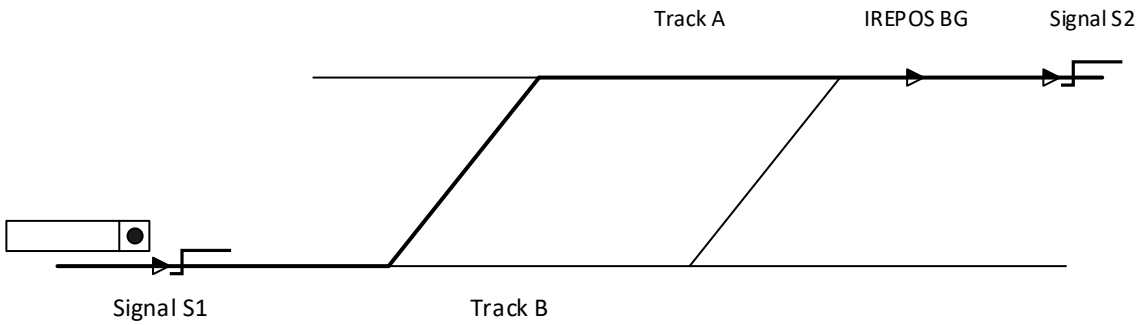
ID	Date	Location / Line
ESC_L1FS_2	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : • Test ESC_L1FS_2: IREPOS The section between signals S1 and S2 is a regrouped section. The itinerary passing by track <track number> (track A) is the longest itinerary of the regrouped itineraries. The IREPOS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

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. Train receives IREPOS information when passing IREPOS BG.	The length of the current section is extended by <Difference of distance between regrouped routes>m.	Pass / Fail	
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

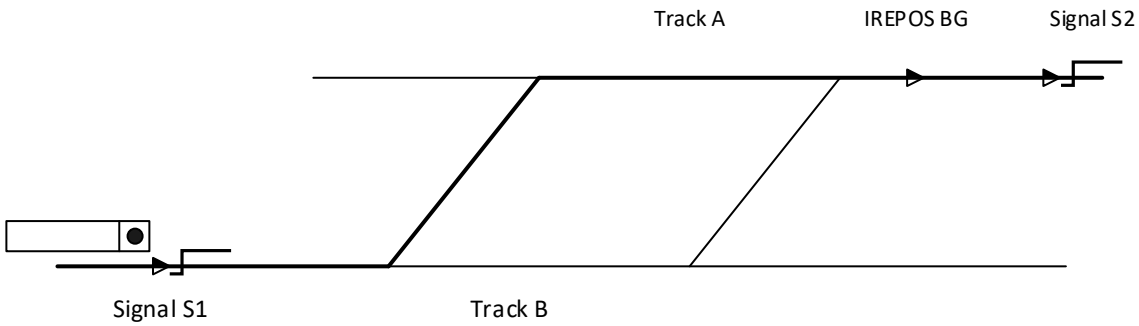
ID	Date	Location / Line
ESC_L1FS_2_part2	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : • Test ESC_L1FS_2: IREPOS The section between signals S1 and S2 is a regrouped section. The itinerary passing by track <track number> (track A) is the longest itinerary of the regrouped itineraries. The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

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

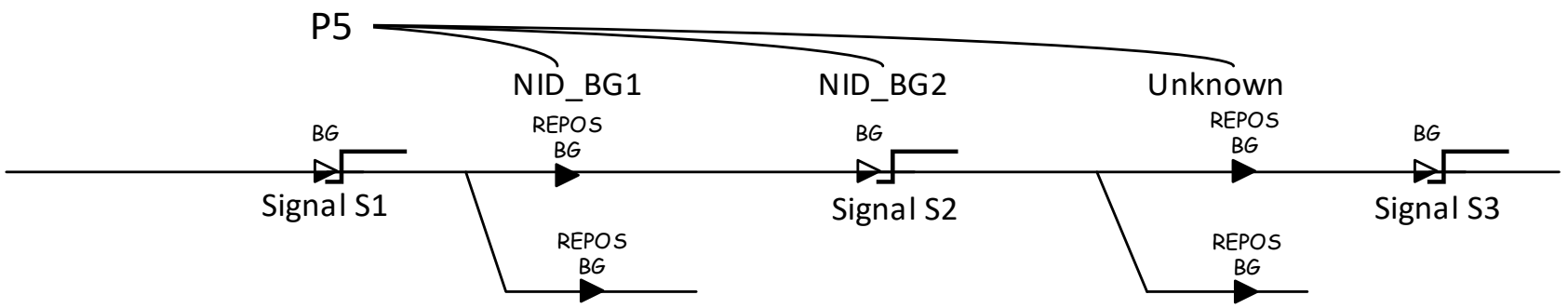
4.4 *Test ESC_L1FS_3: REPOS on two consecutive sections*

4.4.1 Description

ID	Date	Location / Line
ESC_L1FS_3	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - Test ESC_L1FS_3: REPOS on two consecutive sections At a portion of track where the routes are unified in 2 consecutive sections, BG sending the P16 are chained with the known NID_BG on the first section and with the unknown NID_BG on the second section.	
Signal passed		
Name		Trackside datafile in service
S1 : <Signal name> is open		
S2 : <Signal name> is open		
S3 : <Signal name> is closed		
Test Scenarios		
Starting condition	Train in level 1 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 goes to signal 3	No linking error when passing the two repositioning BG's.	Pass / Fail	
Test scenario finished				

4.4.2 Scenario diagram



Final State	Train in level 1 FS in front of signal S3.

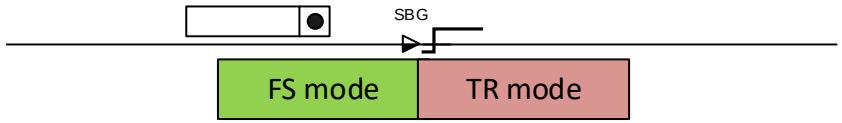
4.5 *Test ESC_L1FS_4: Crossing closed non-permissive signal without override*

4.5.1 Description

ID	Date	Location / Line
ESC_L1FS_4	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : • Test ESC_L1FS_4: Crossing closed non-permissive signal without override	
Signal passed		
Name		Trackside datafile in service
S1 : <Signal name> is a closed-controlled main stop signal.		
Test Scenarios		
Starting condition	Train is : • in level 1 FS 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 without activation of the override. The train should be at low speed when passing the signal.	Train is tripped and emergency brakes are applied.	Pass / Fail	
2			Pass / Fail	
Test scenario finished				

4.5.2 Scenario diagram



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

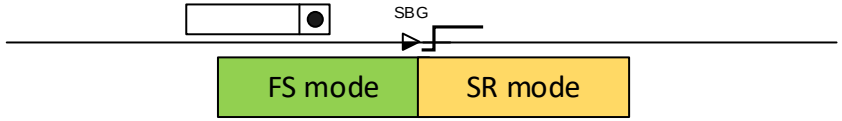
4.6 *Test ESC_L1FS_5: Crossing closed non-permissive signal with override*

4.6.1 Description

ID	Date	Location / Line
ESC_L1FS_5	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : • Test ESC_L1FS_4: Crossing closed non-permissive signal with override	
Signal passed		
Name		Trackside datafile in service
S1 : <Signal name> is a closed-controlled main stop signal.		
S2 : <Signal name> is an opend-main stop signal equipped with an IBG..		
Test Scenarios		
Starting condition	Train is : • in level 1 FS 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 after activation of the override.	Train changes to SR mode.	Pass / Fail	
Test scenario finished				

4.6.2 Scenario diagram



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

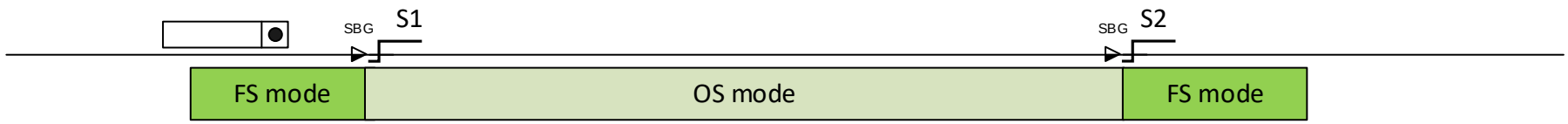
4.7 *Test ESC_L1FS_6: Crossing a closed permissive signal*

4.7.1 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 • 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	Pass / Fail	
Test scenario finished				

4.7.2 Scenario diagram



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

4.8 *Test ESC_L1FS_7 : CR819*

4.8.1 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	
2			Pass / Fail	
Test scenario finished				

4.8.2 Scenario diagram

none	
Final State	Train in level 1 FS beyond fixed BG

4.9 *Test ESC_L1FS_8: CR1120*

4.9.1 Description

ID	Date	Location / Line
ESC_L1FS_8	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_L1FS_8: CR1120 In a transition from level STM TBL1+ to ETCS 1 FS, the train receives a transition announcement applicable to the next signal. This signal is equipped with an IBG. The train crosses the IBG. Expected result: packets 5, 12, 21, 27 received at the IBG are not accepted without accepting packet 136.	

Signal passed	
Name	Trackside datafile in service
S1 : <Signal name of a transition signal> is open presenting Y aspect.	
S2 : <Signal name of a transition signal> is closed.	

Test Scenarios	
Starting condition	Train is in level STM upwards signal S1.
	Train is 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	Train receives an MA with an announcement of transition to level 1.	Pass / Fail	
2	Signaller opens signal S2 before train passes the IBG of signal S2	Train receives infill information and reject packet 136 and packets 5, 12, 21 and 27.	Pass / Fail	
3	Train passes signal S2	Train changes to level 1 FS mode.	Pass / Fail	
Test scenario finished				

4.9.2 Scenario diagram

None	
Final State	Train in level 1 mode FS downwards signal S2.

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

Test case to be defined.

4.10.1 Description

ID	Date	Location / Line
ESC_TR_5	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_5: Transition Level 1 FS to TVM430.	
Signal passed		
Name	Trackside datafile in service	
Test Scenarios		
Starting condition		
	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	**To be defined**		Pass / Fail	
2			Pass / Fail	
3			Pass / Fail	
Test scenario finished				

4.10.2 Scenario diagram

None	
Final State	

4.11 *Test ESC_TR_7: Transition TVM430 to Level 1 FS*

Test case to be defined.

4.11.1 Description

ID	Date	Location / Line
ESC_TR_7	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_7: Transition TVM to ETCS1 FS	
Signal passed		
Name	Trackside datafile in service	
Test Scenarios		
Starting condition		
	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	**To be defined**		Pass / Fail	
2			Pass / Fail	
3			Pass / Fail	
Test scenario finished				

4.11.2 Scenario diagram

None	
Final State	

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

4.12.1 Description

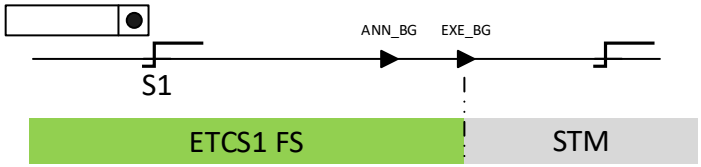
ID	Date	Location / Line
ESC_TR_12	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_12 : Transition ETCS1 FS to STM TBL1+ *Remark: if test case is executed in CVT track, a text message "=>S*" is displayed between from reception of the transition up to the first TBL1+ signal. An acknowledgment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

4.12.2 Scenario diagram



Final State	Train in level STM beyond the EXE_BG.

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

4.13.1 Description

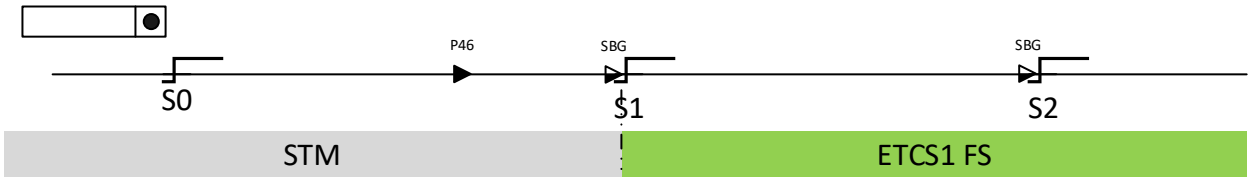
ID	Date	Location / Line
ESC_TR_15	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : - ESC_TR_15 Transition STM TBL1+ to ETCS1 FS *Remark : the transition STM TBL1+ to ETCS1 FS with an announcement of transition at the first signal is tested in test ESC_L1FS_8: CR1120.*	

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 TBL1+ in rear of 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	Train switches to level 1 FS mode.	Pass / Fail	
2	Drivers acknowledges transition	Train remains in level 1 FS mode.	Pass / Fail	
Test scenario finished				

4.13.2 Scenario diagram



Final State	Train is in level 1 FS beyond signal S1