Train protection
ETCS system
All trackside types

ETCS System Compatibility
Test Description

Document Management

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History

Author	Version	Date	§ Adapted	Reason
T. Destrée	1.1 draft 1	17/08/2020	/	Creation of the document
T. Destrée	1.1 draft 2	27/08/2020		Review comments
L. Brelot	1.1 draft 3	28/08/2020		Clarification of the “practical” section in ESC_ALL_2
L. Brelot	1.1	31/08/2020		Major version
T. Destrée	1.2 draft 1	4/10/2022		Correction of the test case ESC_COM_3 and ESC_TR_17
	1.2 draft 2	15/11/2022		Review comments.
	1.2	8/02/2023		New version of [1]
T. Destrée	1.3 draft 1	28/11/2023		Confidentiality clause modified. Test cases deleted : ESC_COM_2, ESC_COM_3, ESC_TR_17 Adaptation of ESC_ALL_2
T. Destrée	1.3	3/05/2024		Adaptation of ESC_ALL_2 Document release
T. Destrée	1.4	4/04/2025	1.2, 4.2	Simplification of ESC_ALL_2 for Baseline 3 trains.

Abrogated documents

Name	Version	Date

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Table of Contents

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 and the On-board. This document contains test cases applicable to all ETCS trackside types.
The test cases “ESC_ALL_x” needs to be done on each trackside type.
The test cases “ESC_COM_x” needs to be done on one of the trackside types (and are valid for the others trackside types).
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 ETCS areas on Infrabel network.

The technical specification for interoperability used are defined in [1].

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 1.9	Infrabel

1.3 Reference documents

Ref.	*Title*	*Owner*
[2]	PSI (TC,ETCSdata,z) national values 3.2 F	Infrabel
[3]	Exigences nationales d'Infrabel pour les courbes de freinage ETCS Full Supervision du réseau conventionnel 1.2 F	Infrabel
[4]	Exigences nationales d'Infrabel pour les courbes de freinage ETCS Full Supervision Baseline 2 des LGV 1.1 F	Infrabel
[5]	Exigences nationales d'Infrabel pour les courbes de freinage ETCS Limited Supervision du réseau conventionnel 1.1 F	Infrabel

1.4 Annexes

Ref.	*Title*	*Owner*
[6]	Document	Owner

1.5 Scope

This document is applicable for all trains would run under the protection of ETCS on the Infrabel conventional network.

1.6 Definitions, symbols and abbreviations

2Y	Aspect wo yellow displayed by the signal
CCS	Control Command System
CES	Conditional Emergency Stop
DMI	Driver Machine Interface

ESC	ETCS System Compatibility
ETCS	European Train Control System
LS	Limited Supervision
NR	Not Relevant
OBU	On Board Unit
RNP	Aspect Red not permissive displayed by the signal
SBG	Signal Balise Group
SFE	Safe Front End
SoM	Start of Mission
TSI	Technical Specification for Interoperability
UES	Unconditional Emergency Stop

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_ALL_1	Driving ergonomics and nominal conditions
ESC_ALL_2	Braking curves
ESC_COM_1	Receiving a P203 by an OBU B3
ESC_COM_2	Intentionally deleted
ESC_COM_3	Intentionally deleted
ESC_COM_4	Receiving a P203 by an OBU B2
ESC_COM_5	Odometer precision
ESC_COM_6	Resetting the confidence interval
ESC_COM_7	Technical functions of electrical traction in zone FS (voltage change)
ESC_COM_8	Intentionally deleted
ESC_COM_9	Technical functions of electrical traction in zone FS (phase change)
ESC_TR_17	Intentionally deleted

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

4. Test scenarios

4.1 ESC_ALL_1: Driving ergonomics in nominal conditions

No specific scenario is defined. During the whole test campaign, the tester observes the behavior of the system in nominal situation while the driver acts in compliance with regulation.

4.2 ESC_ALL_2 : Braking curves

Braking curves conform to the requirements.

1. No unexpected braking interventions and no SPADs detected during the ESC campaign.
2. Braking curves analyzed and conform to the requirements defined in [3], [4] and [5] for Baseline 2 trains only.
    a. The applicant delivers a documentary summary of the methodology by the chosen ETCS braking curve parameters to the ESC Test Manager and Infrabel.
    b. The list of chosen ETCS braking curve parameters by the applicant is to be assessed according to the Infrabel requirements defined in [3], [4] and [5].

    If no braking curves simulation are provided, dedicated scenarios for these tests are to be agreed with the ESC Test Manager to be able to validate the expected results.

4.3 ESC_COM_1: Receiving a P203 by an OBU B3

This test case is only applicable to Baseline 3 trains and has to be executed on a trackside type sending P203 with M_VERSION 1.1.
The test cases ESC_TR_3 or ESC_TR_4 can be used to test this functionality.

4.3.1 Description

ID	Date	Location / Line
ESC_COM_1	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : Receiving a P203 by an OBU B3 A Baseline 3 train with national values for LS-area receives national values for FS-area.	

Signal passed	
Name	Trackside datafile in service

Test Scenarios	
Starting condition	**Train 1 is a Baseline 3 train with LS-area national values stored onboard.**
	Train is in level 1, mode SR or LS
	Train 1 is upwards a BG sending national values for FS area (P3 and P203)
	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 BG and receives the national values (P3 and P203)	The national values defined in P203 (see [2]) are stored onboard,	Pass / Fail	
Test scenario finished				

4.3.2 Scenario diagram

None	
Final State	

4.4 ESC_COM_2: Intentionally deleted

4.5 ESC_COM_3: Intentionally deleted

4.6 ESC_COM_4: Receiving a P203 by an OBU B2

This test case is only applicable to Baseline 2 trains and has to be executed on a trackside type sending P203 with M_VERSION 1.1.
The test cases ESC_TR_3 or ESC_TR_4 can be used to test this functionality.

4.6.1 Description

ID	Date	Location / Line
ESC_COM_4	<dd/mm/yyyy>	<Line>
Description	• Receiving a P203 by an OBU B2	
Signal passed		
Name	Trackside datafile in service	
Test Scenarios		
Starting condition	**Train 1 is a Baseline 2 train.**	
	Train is in level 1, mode SR	
	Train 1 is upwards a BG sending national values (P3 and P203)	
	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 BG and receives an MA with the national values (P3 and P203)	The OBU accepts the message and the national values defined in P3 are stored onboard.	Pass / Fail	
Test scenario finished				

4.6.2 Scenario diagram

None

Final State	

4.7 ESC_COM_5: Odometer precision

4.7.1 Description

ID	Date	Location / Line
ESC_COM_5	<dd/mm/yyyy>	<Line>
Description	Odometer precision	
Signal passed		
Name		Trackside datafile in service
Test Scenarios		
Starting condition	Train is in SR mode.	
	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	An error is introduced while recording the wheel diameter	None		
2	Train starts	odometry errors are recorded by the JRU: Distances and errors are listed here under : Distance 1: <xxx> m L_DOUBTUNDER : <xxx> m L_DOUBTOVER : <xxx> m Distance 2: <xxx> m L_DOUBTUNDER : <xxx> m L_DOUBTOVER : <xxx> m …	(Informative)	
4	Correct the error in the wheel diameter	None		
Test scenario finished				

4.7.2 Scenario diagram

None
Final State

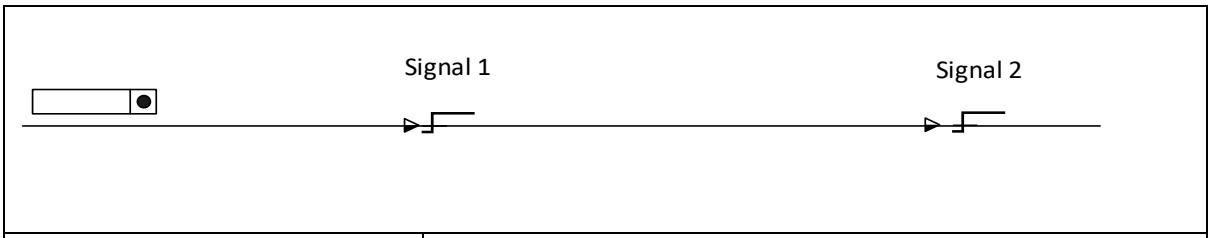
4.8 ESC_COM_6: Resetting the confidence interval

4.8.1 Description

ID	Date	Location / Line
ESC_COM_6	<dd/mm/yyyy>	<Line>
Description	Resetting the confidence interval, Checking the resetting of the confidence interval when passing a BG when there is linking information on board and when there isn't linking on board.	
Signal passed		
Name		Trackside datafile in service
Signal 1 :<signal name> is an open signal equipped with an ETCS1 FS SBG		
Signal 2 :<signal name> is an open signal equipped with an ETCS1 FS SBG		
Test Scenarios		
Starting condition	Train 1 is in level 1 mode SR.	
	Train is more than 250m upwards signal 1 without BG between the train and the SBG.	
	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 runs towards signal 1	Odometry error increase	Pass / Fail	
2	Train passes the SBG of signal 1	Train changes to FS mode and odometry is reset (L_DOUBTUNDER and L_DOUBTOVER)	Pass / Fail	
3	Train passes the SBG of signal 2	Odometry is reset (L_DOUBTUNDER and L_DOUBTOVER)	Pass / Fail	
Test scenario finished				

4.8.2 Scenario diagram



Final State	

4.9 ESC_COM_7: Technical functions of electrical traction in zone FS (voltage change)

4.9.1 Description

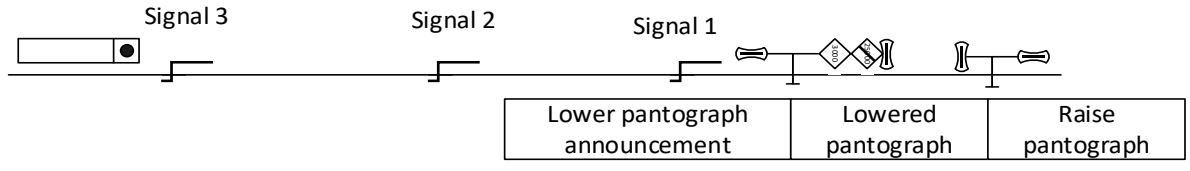
ID	Date	Location / Line
ESC_COM_7	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : Technical functions of electrical traction in zone FS (catenary voltage change)	

Signal passed	
Name	Trackside datafile in service
Signal 1 : <signal name> is protecting an area where a track condition is defined.	
Signal 2 : <signal name> is an open main stop signal	
Signal 3 : <signal name> is an open main stop signal	

Test Scenarios	
Starting condition	**Train is in FS mode upwards signal 3.**
	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 approaches Signal 1 in FS mode	"Lower pantograph announcement" icon is displayed on the DMI.	Pass / Fail	
2	Train passes the panel at the entry of the change of power traction area.	"Lower pantograph" icon is displayed on the DMI.	Pass / Fail	
3	Last pantograph of the train passes the panel at the end of the change of power traction area.	"Raise pantograph" icon is displayed on the DMI	Pass / Fail	
Test scenario finished				

4.9.2 Scenario diagram



Final State	

4.10 ESC_COM_8: Intentionally deleted

4.11 ESC_COM_9: Technical functions of electrical traction in zone FS (phase change)

4.11.1 Description

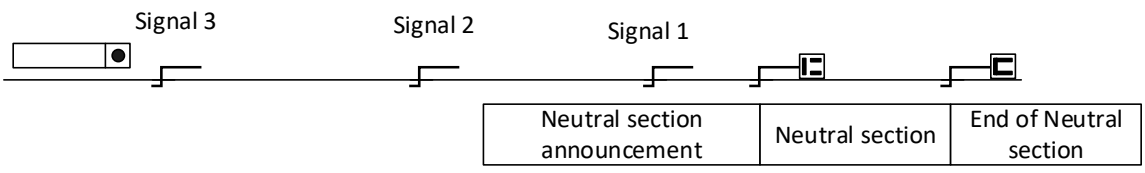
ID	Date	Location / Line
ESC_COM_9	<dd/mm/yyyy>	<Line>
Description	Functionalities tested : Technical functions of electrical traction in zone FS (catenary phase change) on a 25kV line.	

Signal passed	
Name	Trackside datafile in service
Signal 1 : <signal name> is protection an area where a track condition is defined.	
Signal 2 : <signal name> is an open main stop signal	
Signal 3 : <signal name> is an open main stop signal	

Test Scenarios	
Starting condition	**Train is in FS mode upwards signal 3.**
	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 approaches Signal 1 in FS mode	"Neutral section announcement" icon is displayed on the DMI.	Pass / Fail	
2	Train passes the panel at the entry of the change of power traction area.	"Neutral section" icon is displayed on the DMI.	Pass / Fail	
3	Last pantograph of the train passes the panel at the end of the change of power traction area.	"End of Neutral section" icon is displayed on the DMI	Pass / Fail	
Test scenario finished				

4.11.2 Scenario diagram



Final State	

4.12 ESC_TR_17: Intentionally deleted