TC
ETCS Level 2
On the conventional network
Train to Track Integration TST
Test Specifications

Document management

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History

Author	Version	Date	Modified §	Motivation
T. Destrée	1.1	13/06/2018		Document creation
T. Destrée	1.2	02/07/2018	4.3, 4.4	SiPR29908
T. Destrée	1.3	29/11/2018	4.3	SPAD test removed.
T. Destrée	1.4	04/07/2019	4.2 (Initial state, step 8), 4.4(step 4 and 9)	Added the possibility to occupy track detection system instead of CLOSE command to close a non-controlled signal.

Abrogated documents

Name	Version	Date

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1. Introduction

1.1 Purpose of the document

This document describes the additional Train to Track Integration (TTI) test scenarios to be performed by a train already authorized to run in ETCS Level 2 on the Infrabel's high speed network to be allowed to use the ETCS Level 2 on the Infrabel's conventional network.

According to TSI §6.1.2 of [1], this document is put by Infrabel at disposal of the applicants wanting to authorize trains to run in ETCS2 on Infrabel conventional network. The test scenarios identified in this document are to be carried out by the applicant that owes the rolling stock to be authorized.

These Track to Train Integration (TTI) tests must be included by the applicant in an authorization process with the National Safety Authority.

1.2 Basic documents

None

1.3 Reference documents

[1] TSI CCS 2012/88

[2] TSI CCS 2015/14

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1.4 Annexes

None

1.5 Scope

The scope of these tests is to determine if an authorized L2 train can run in ETCS2 on the Infrabel's conventional network.

1.6 Definitions, symbols and abbreviations

SoM	Start of Mission
ETCS	European Train Control System
RBC	Radio Block Centre
TBL1+	Transmissie Baken Locomotief
GSM-R	Global System for Mobile communications - Railways
EoA	End of Authority
MA	Movement Authority
SH	Shunting
FS	Full Supervision
OS	On Site
BG	Balise Group
LM	Large Movement
CES	Conditional Emergency Stop

UES	Unconditional Emergency Stop
SSP	Static Speed Profile
>	Route traced in small movement
>>	Route traced in large movement

1.7 Known imperfections

As long as the tests take place on line 73 not all functionalities that might be encountered on the Infrabel network are testable on this line. Other tests could be added later with new lines put into service.

2. Test Execution

The tests described hereunder are executed on the line 73 between Lichtervelde and De Panne.

Before the execution of the tests, the key of the train has to be loaded in the RBC.

3. Test reports

The test reports, to be handed over to the National Safety Authority and Infrabel must include:

- the train descriptions
  - train type,
  - train length,
  - brake percentage,
  - maximum train speed,
  - ETCS system version,
  - OBU model and version
  - …
- The following scenarios filled with the test results.

4. Scenarios

For the determination of the scenarios the following points are taken into consideration:

- Normal run over the line with transition STM → Level 2,
- Normal run over the line with transition Level 2 → STM,
- Specific working of Siemens RBC used on P001RF,
- Messages that are not sent on High Speed Lines (L3 or L4) in ETCS Level 2.

4.1 Nominal run 1

Test case identifier	TTI 1
Title	Nominal run 1
Description	This test case covers following functionalities: • Session establishment between the train and the OBU • Nominal level transition from STM to Level 2 • Run in FS • MA extensions • Reception of Text Message via RBC • Text message =>S • SH commanded by RBC
Initial State	• Traced route GN >> DN >> JS >> KS • Keys of the train are present in the RBC

Step	Action	Expected Reaction	Ok?
1.	Train passes BG 255_1000	Train connects to the RBC	
2.	Train approaches signal A629	Transition to ETCS Level 2 is announced The driver is asked to confirm the transition to Level 2	
3.	Confirm the transition	About 60m beyond A629 the train performs the transition to ETCS Level 2	
4.	Follow the MA	As the train continues updates of MA are received	
6.	Approach EoA at signal KS	Reception of Text Message “=> S” sent by RBC about 300m upstream the signal KS.	

		The release speed to be respected is 20km/h.	
7.	Stop the train in front of KS		
8.	Trace route KS >> CT >> FT >> MT > 774 (MT is opened in small movement)	After opening of the signal KS an updated MA is received	
9.	Continue driving		
10.	Train approaches signal MT	In the MA-window of signal MT the train receives an MA with Mode Profile SH Driver is requested to acknowledge SH mode	
10.	Acknowledge SH mode	Train is in SH. Connection to the RBC is closed	
11.	Continue driving until track 774		

Remarks:			
Test environment version:	On site	**Overall evaluation:**	
Signed by tester:		**date:**	

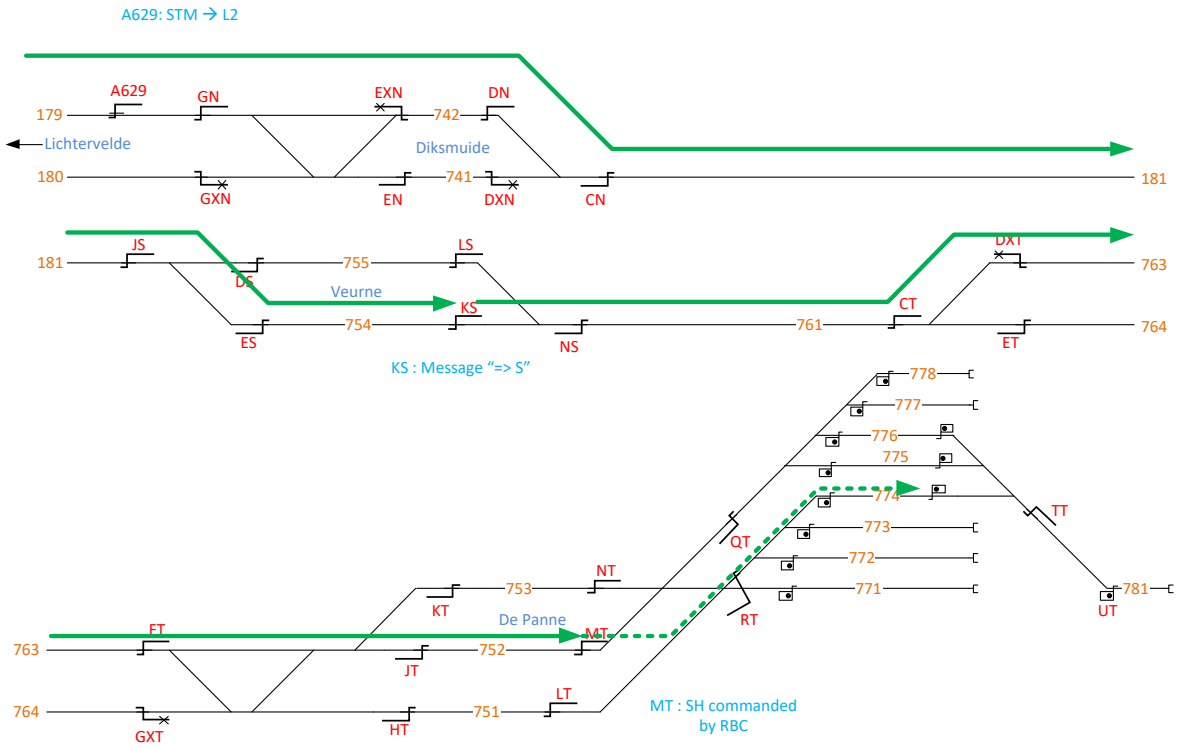

Figure 1

4.2 Nominal run 2

Test case identifier	TTI 2
Title	Nominal 2
Description	Tested functionalities : • SH manually selected • SoM in a trusted Area • Mode transition FS → OS • Mode transition OS → FS • Nominal transition L2 → STM
Initial State	• Keys of the train are available in the RBC • Traced route r774t > JT (small movement) • B741 is closed : ○ by CLOSE command applied on signal B741 **OR** ○ by occupying the track detection downstream B741

Step	Action	Expected Reaction	Ok?
1.	Start the train	Train establish a session with the RBC	
2.	Driver selects level 2 and chooses SH	SH is authorized by the RBC and the session is closed by the RBC.	
3.	Drive to signal JT		
4.	At signal JT perform SOM in SR	Train re-connects to RBC	
5.	On request of the train staff: Route JT >> ET >> NS >> ES >> CN >> EN >> 180	When signal JT opens the RBC sends an MA with Mode Profile OS until the signal Driver is requested to acknowledge OS mode	
6.	Acknowledge mode OS and start driving	Transition OS → FS when passing signal JT	
7.	Train approaches signal B741	In the MA window of the signal the driver is asked to acknowledge OS mode.	
8.	Acknowledge OS mode and continue driving (with respect of operational procedures for passing RP signal). After passing the signal, remove the track occupation if applicable.	After passing signal B727 transition OS → FS	
9.	Pass the last equipped signal (EN)		
10.	Train approaches the transition to STM	Transition is announced Verify the allowed speed at the transition (1)	
11.	Confirm the transition	At BG 255_980 the transition to STM is executed	
12.	Continue driving to Lichtervelde		

Remarks:	(1) Maximum allowed speed : • 120km/h for passenger trains • 100km/h for freight trains (P brakes) • 90km/h for freight trains (G brakes)

Test environment version:	On site	**Overall evaluation:**	
Signed by tester:		**date:**	

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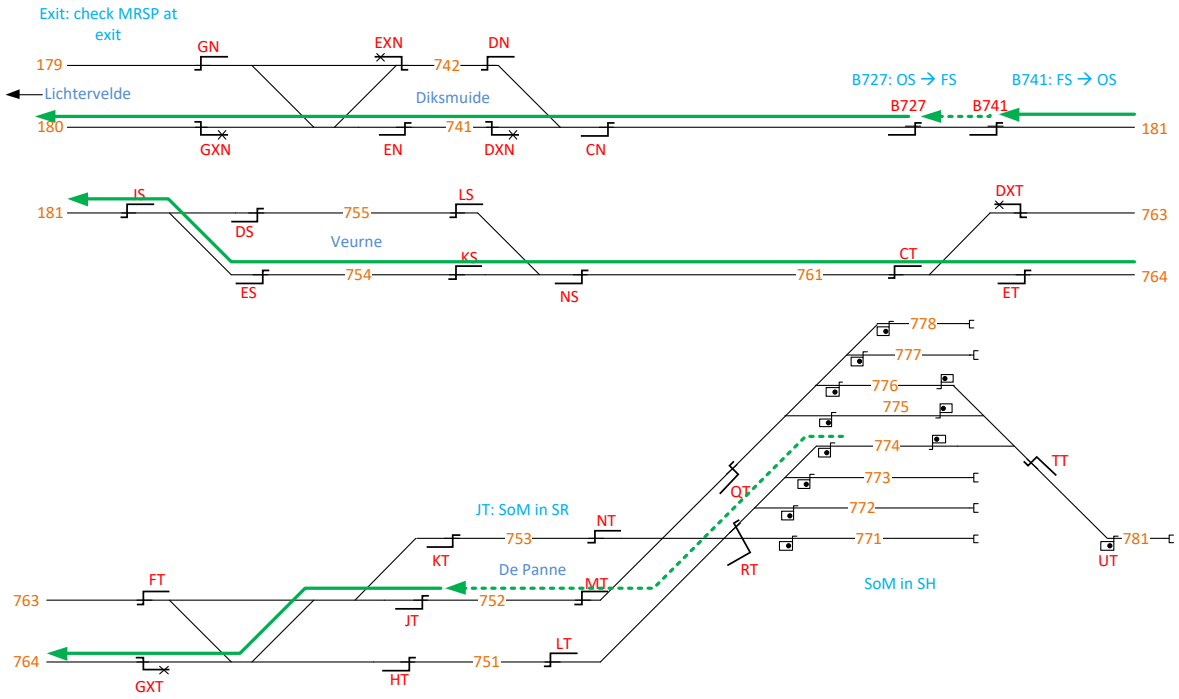

Figure 2

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4.3 T_NVCONTACT

Test case identifier	TTI 3
Title	T_NVCONTACT
Description	Tested functionalities: • Shunting refused • T_NVCONTACT reaction
Initial State	Traced route GN >> DN >> JS >> KS

Step	Action	Expected Reaction	Ok?
1.	Train passes BG 255_1000	Train connects to the RBC	
2.	Train approaches signal A629	Transition to ETCS Level 2 is announced The driver is asked to confirm the transition to Level 2. *Post run analyse: Confirm that the train uses a T_NVCONTACT = 13s and M_NVCONTACT = Train Trip before transition (log files).*	
3.	Confirm the transition	About 60m beyond A629 the train performs the transition to ETCS Level 2	
4.	Driver stop train in front of DN.		
5.	Disconnect the OBU from the antenna to cause a loss of connection.	**After 40 seconds, train does a Service Brake reaction.** MA is shortened to the position of the train.	
6.	Reconnect the antenna to the OBU.	Train receives an FS MA.	
7.	Continue driving to De Panne	At route extensions an MA update is received	
8.	Trace route KS >> CT >> FT >> MT >> 774		
9.	Continue driving in the direction of De Panne		
10.	Stop train in front of MT opened in LM and select SH	SH is refused by the RBC	
11.	Continue to the yard in LM and pass the signal MT.	Train receives an FS MA.	
12.	Drive to the yard according the received MA		

Remarks:			
Test environment version:	On site	**Overall evaluation:**	
Signed by tester:		**date:**	

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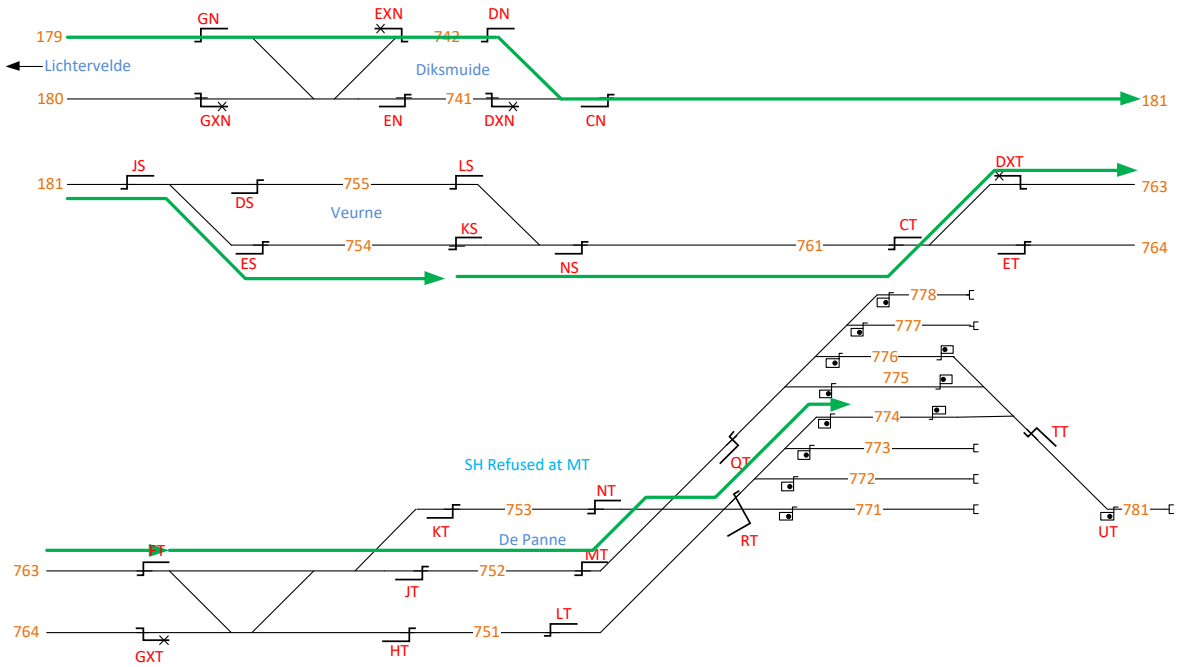

Figure 3

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2
0
1
9
-
0
9
5
1
-
8
9

4.4 Emergency stops and transition to STM in CVT

Test case identifier	TTI 4
Title	Emergency stops and transition to STM in CVT

Description	Tested functionalities:
	• Test of emergency stops:
	  ◦ CES
	  ◦ UES
	• Validation of CR958
	• Partially covered duplicated BG
	• Text message "=>S*"

Initial State	• Key is in the RBC • Train is in No Power mode • Traced route JT >> ET >> NS >> ES >> CN

Step	Action	Expected Reaction	Ok?
1.	SOM in SR in front of JT	Train connects to the RBC with a M157/SoM Position Report with Q_STATUS=invalid. RBC replies with M41/Train Accepted (LRBG='unknown') and the on-board deletes its position data.	
2.	Start driving in the direction of Diksmuide	Train in SR mode	
3.	Train passes JT	Train receives an FS MA.	
4.	When train passes signal B755, close signal B741: ○ by CLOSE command applied on signal B741 **OR** ○ by occupying the track detection downstream B741	1. RBC sends CES to the train (Message 15)	
5.		2. CES is accepted by the train (Release speed = 0km/h and shortened MA).	
6.		3. RBC revokes the CES (Message 18)	
7.		4. Train reports its position and RBC sends a new MA with EoA at signal B741 (Release speed = 40km/h).	
8.	Stop the train in front of signal B741	Train receives an OS MA.	
9.	Re-open signal B741 or remove the track occupancy downstream B741. **Train remains at standstill**	Update of the MA until signal CN	
10	Perform CSTR on track 181	RBC sends UES (Message 16) Train goes to TRIP	
11.	Driver acknowledges the trip	1. Train goes to Post Trip mode	
		2. RBC sends revocation of ES for every possible NID_EM (Message 18)	
13.	Take away CSTR on track 181, and driver select "START"	Train requests an MA to the RBC, Then train receives an OS MA.	
14.	Pass the signal	Train receives an FS MA	
15.	Trace Route CN >> EN >> 179	Update of the MA	

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13.	Follow the MA	At route extensions an MA update is received	
14.	Pass the last equipped signal		
15.	**Stop before BK63941 (±250m downstream G-N.7) and cover one balise of BG 255_00979.**		
16.	Train passes the partially covered BG.	Transition is announced and Text =>S* is shown on the DMI	
17.	Confirm text =>S*	Verify the allowed speed at the transition (1)	
18.	**Uncover the balise of the BG 255_00979**		
	Confirm the transition	At BG 255_982 the transition to STM is executed	

Remarks:	(1) Maximum allowed speed : • 120km/h for passenger trains • 100km/h for freight trains (P brakes) • 90km/h for freight trains (G brakes)		
Test environment version:	On site	**Overall evaluation:**	
Signed by tester:		**date:**	

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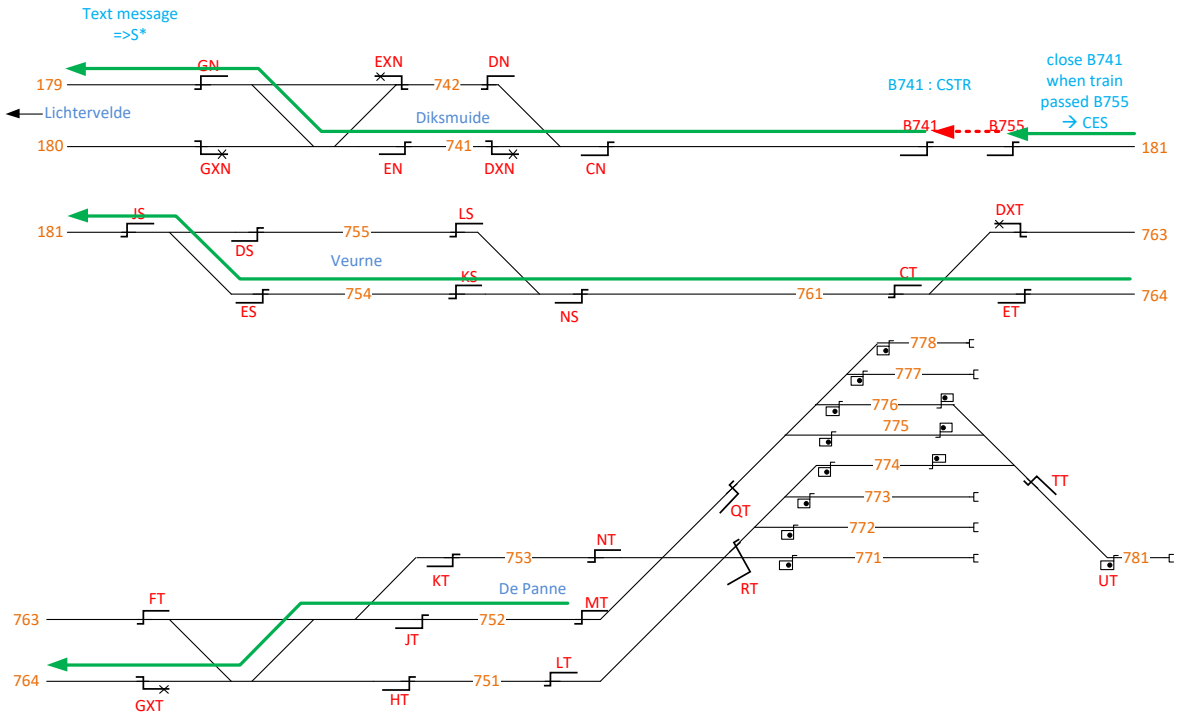

Figure 4