

## ERTMS UNIT

### ETCS TEST PLAN AND METHODOLOGY FOR SS-076

**Reference:** ERA\_ERTMS\_040092

**Document type:** Technical

**Version :** 1.0.0

**Date :** 12/09/2017

	Edited by	Quality review	Approved by
<b>Name</b>	Oscar REBOLLO BRAVO	Oscar REBOLLO BRAVO	Pio GUIDO
<b>Position</b>	ERTMS Unit Project Officer	ERTMS Unit Project Officer	ERTMS Head of Unit
<b>Date &amp; Signat.</b>			



## Amendment record

Version	Date	Section number	Modification/description	Author(s)
0.0.1	13/07/2015	All	Creation of the document. Based on Ss-076-0 v233, Ss-076-2 v230 and Ss-76-3 v231	Oscar Rebollo Bravo
0.0.2	1/12/2015	1.1, 2, 4.2.1.15, 4.3.1, 5, 6, 7	Inclusion of the content of Ss-076-4-1 v102, Ss-076-6-4 v233 and Ss-076-6-8 v101 updated for Baseline 3	Jean-François Verdin
0.0.3	11/12/2015	4.2, 2, 4.2.1.15, 4.3.1, 5, 6, 7	Removal of section 4.2 (Feature List), modification of section "4.3 Inclusion of Features", inclusion of section 4.4, inclusion of section 5 (Ss-076-5-4 v310 updated for Baseline 3)	Miguel Fernández Elorriaga
0.0.4	12/1/2016	4.4.1.9, 6.2.8.1.3, 6.2.8.1.4, 6.2.8.3, 6.2.8.3.2, 6.2.8.4, 6.2.9.1.4, 7.1.1.2, 8.2.1.1, 8.3.2, 8.3.3, 8.3.4, 8.3.5, A.3, A.4	Application of solution to CR1265, check of references, NID_ENGINE set to 76000d instead of 76000h, Airtight set to Fitted instead of unfitted, forgotten unnecessary emergency brake component speeds removed	Jean-François Verdin
0.0.5	28/10/2016	2.1, 2.3, 3.1.1.1, 4.2, 4.4.1.2, 4.4.1.14, 6.2.8.1.4, 6.2.8.3.1.3, 6.2.8.3.2.3, 6.2.12.1.2.2, 6.2.12.3, 6.2.12.4, 6.3.2.2.8, 6.3.2.2.9, 8.3.6, 8.15	Inclusion of review comments from WG SS076	Jean-François Verdin
0.0.6	25/01/2017	1, 2.1, 2.3, 3.1.1.1 c), 3.1.1.3, 4.2.1.4, 4.2.2.1, 4.2.2.2, 4.2.3.2, 4.4.1.13, 4.4.1.14, 6.2.4.6, 6.2.6, 6.2.8.1, 6.2.8.3.2.1, 6.2.9.1, 6.2.12.1.2, 6.2.12.4.1, 8.1.1.2, 8.15, A	Inclusion of review comments from WG SS076	Jean-François Verdin
0.0.7	24/02/2017	8.3.2, 8.3.3, B		Isabel Herreros
0.0.8	15/05/2017	2, 3.1.1.3, 4.4, 5, 6.2, 6.3, 7, 8.2, 8.3, 8.7, A	Inclusion of review comments from WG SS076, removal of srs360 information, update default start of missions	Quentin Jehaes

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

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Version	Date	Section number	Modification/description	Author(s)
0.0.9	24/05/2017	4.4.1.12, 6.2, A	Inclusion of review comments from WG SS076	Quentin Jehaes
0.0.10	5/07/2017	8.3, 8.6	Inclusion of review comments from WG SS076	Quentin Jehaes
1.0.0	12/09/2017	3.1.1.2, page footer	Inclusion of review comments from WG SS076	Quentin Jehaes

## Table of contents

1. OBJECTIVE .....	6
2. REFERENCES, ABBREVIATIONS AND DEFINITIONS .....	8
3. CONTENT OF THE SS-076 .....	10
4. METHODOLOGY TO PREPARE FEATURES .....	12
5. REQUIREMENTS COVERAGE .....	33
6. METHODOLOGY AND RULES TO PREPARE TEST SEQUENCES .....	34
7. TEST CASES COVERAGE .....	52
8. TRAIN PARAMETERS FOR TEST SEQUENCES .....	53
ANNEX A DEFAULT START OF MISSIONS .....	86
ANNEX B AN EXAMPLE OF THE BRAKING CURVES CALCULATION .....	112

# **1. OBJECTIVE**

## **1.1 Foreword**

- 1.1.1.1** This document has been drafted as an update to the ETCS Baseline 3 of the informative documents in the Subset-076 suite. The document collects the generic information contained in the documents for the ETCS Baseline 2 listed in Table 1.

*Table 1: Input documents*

<b>Document</b>	<b>Title</b>
SUBSET-076-0	Test Plan
SUBSET-076-2	Methodology to Prepare Features
SUBSET-076-3	Methodology of testing
SUBSET-076-4-1	Test sequence generation: Methodology and Rules
SUBSET-076-6-4	Test Cases Coverage
SUBSET-076-6-8	Generic train data for test Sequences

## **1.2 Scope & field of application**

- 1.2.1.1** The objective of this document is providing information related to the context in which the mandatory documents of Ss-076 (scope of the test specifications, test cases and test sequences) are defined.
- 1.2.1.2** This document mainly presents the methodology and defines a set of rules related to the way the test cases and the test sequences of the Ss-076 are designed.
- 1.2.1.3** This document is applicable to the ETCS Baseline 3.

## **1.3 Document description**

- 1.3.1.1** Chapter 3 mainly lists the mandatory and informative documents of Ss-076.
- 1.3.1.2** Chapter 4 presents the methodology to prepare the features and the test cases. A template and the rules to follow to design the test cases are specified.
- 1.3.1.3** Chapter 5 checks the coverage of the onboard requirements of Ss-026 by the test cases of Ss-076.
- 1.3.1.4** Chapter 6 presents the methodology to prepare the test sequences. The purpose of the test sequences is explained and the rules followed to design the test sequences are specified. The way the test cases are covered in the test sequences is defined.
- 1.3.1.5** Chapter 7 checks the correct coverage of the test cases by the test sequences as defined in the previous chapter.

- 1.3.1.6** Chapter 8 describes the train parameters used in Ss-076. Those parameters apply both to the way the test cases and test sequences are defined and to the required configuration for an onboard equipment under test within the framework of Ss-076. Among the train parameters, different train data sets are defined: several train data sets to allow the test of the braking curves with several combinations of train data and a generic train data set for the test sequences not related to the test of the braking curves.
- 1.3.1.7** Annex A describes the default Start of Missions used in the test sequences.
- 1.3.1.8** Annex B gives an example of the braking curves calculation.

## 2. REFERENCES, ABBREVIATIONS AND DEFINITIONS

### 2.1 Reference documents

*Table 2: Reference documents*

Ref. N°	Document Reference	Title
[1]	SUBSET-023	Glossary of Terms and Abbreviations
[2]	SUBSET-026	System Requirement Specification
[3]	SUBSET-027	FFFIS Juridical Recorder-Downloading tool
[4]	SUBSET-036	FFFIS for Eurobalise
[5]	SUBSET-076-5-2	Test Cases
[6]	SUBSET-076-6-3	Test Sequences
[7]	SUBSET-094	Functional requirements for an on-board reference test facility
[8]	ERA_ERTMS_0155 60	ETCS Driver Machine Interface
[9]		<a href="#">ERA Braking Curves Tool</a>
[10]	EIRENE SRS	GSM-R System Requirements Specification

### 2.2 Abbreviations

*Table 3: Abbreviations*

Abbreviation	Meaning
BG	Balise Group
CR	Change Request
ERA	European Railway Agency
SoM/EoM	Start/End of Mission
Ss	Subset
TC	Test Case
TCDB	Test Case Database
TS	Test Sequence
MinFront	Minimum safe front end
MaxFront	Maximum safe front end
MinAnt	Minimum safe antenna position
MaxAnt	Maximum safe antenna position

*Table 3: Abbreviations*

<b>Abbreviation</b>	<b>Meaning</b>
EstAnt	Antenna position
MinRear	Minimum safe rear end

## 2.3 Definitions

*Table 4: Definitions*

<b>Definition</b>	<b>Meaning</b>
Test Case	It is a formal, functional and technical description of the tests needed in order to demonstrate the compliance of an ETCS on-board equipment with a finite list of onboard requirements of Ss-026. A test case is defined in a .doc file.
Test Sequence	<p>It is a concatenation of test cases applied with a specific trackside engineering and a train model. A test sequence is composed by the following files:</p> <ul style="list-style-type: none"> <li>• a test sequence file description (.doc file),</li> <li>• a test sequence database (.mdb file),</li> <li>• a test sequence speed profile (.bmp file) (not present for a sequence entirely at standstill),</li> <li>• and possibly one or more braking curve simulation for the sequences testing braking curves (.xls file)</li> </ul>
Feature	It is a group of test cases testing a set of SRS requirements.

### **3. CONTENT OF THE Ss-076**

#### **3.1 Introduction**

**3.1.1.1** The Ss-076 is composed of the following mandatory documents:

a) Scope of the test specifications (Ss-076-7)

This document explains the purpose of the Ss-076 and provides the list of TSs to perform a test campaign. It also identifies clearly the sequences that contain optional (RIU, Euroloop, Cold Movement Detector) or miscellaneous (Level 3, Level NTC) functionalities.

b) Test cases related to features (Ss-076-5-2)

Test Cases are the basis of the Ss-076. These are the formal, functional and technical descriptions of the tests needed in order to prove interoperability and demonstrating the compliance of an ETCS on-board equipment with the Subset-026. Each TC includes the set of requirements tested.

c) Test sequences (Ss-076-6-3)

A Test Sequence is a set of concatenated TCs starting always in NP mode and finishing normally in NP mode. A Test Sequence shall be used for an automatic execution of the test cases, by concatenating them into scenarios which can be run within the test environment defined in the Ss-094. The complete set of TSs covers all TCs and therefore, all Subset-026 onboard requirements testable with this test environment. A Test sequence emerge as a complete defined journey, ready to be implemented in a test environment. The journey speed profile, the driver input and the messages (radio, loop and balise) sent to the on-board equipment are completely defined in each journey.

**3.1.1.2** The Ss-076 is composed of the following informative documents:

a) ETCS test plan and methodology for Ss-076 (ERA/ERTMS/040092)

This document summarises the set of documents included in the Ss-076, provides the methodology to prepare features (testcases) and the methodology for testing on-board equipments.

b) Test case database for Ss-076 (ERA/ERTMS/040093)

It is a MS Access database including all test cases of Ss-076-5-2 but in an electronic standard format to facilitate the management, creation and modification of TCs. The mandatory document is the Subset-076-5-2, but a complete traceability between both documents is assure.

c) Test Sequences Evaluation and Validation for Ss-076 (ERA/ERTMS/040063)

This document explains the ranges for validating in an automatic way the steps of a Test sequence, as well as the mainlines to evaluate the result of a TS execution in a laboratory compliant with Subset-094.

**3.1.1.3** The creation of Ss-076 was supported by proprietary tools:

a) Test sequence creation tool

This tool has been used to build up the Test sequences. It takes the TCs from the TCDB and gives the creator the possibility of building a TS, by defining all the needed data (speed profile, the balise, loop or radio messages, etc... ). The tool creates the database corresponding to the TS, the word file, the bit map speed profile and the test cases coverage.

b) Test sequence debugging tool

All the TSs have been run in a lab in order to check their correctness. This tool simulates the behaviour of an on-board equipment by implementing the whole set of Subset-026 requirements, and allows to run the TSs in a lab without need of a real on-board equipment.

**3.1.1.3.1** Ss-076 is independent of those tools.

## 4. METHODOLOGY TO PREPARE FEATURES

### 4.1 Feature Principles

- 4.1.1.1** The Subset-026 specifies the interoperable system requirements for ETCS, for many requirements it is not possible to test them directly at the standardised interfaces.
- 4.1.1.2** Turning every requirement into a test case would result in a vast number of test cases. To solve the problem, a concept of a reduced number of functional entities, called features, is necessary.
- 4.1.1.3** Every Subset-026 requirement shall be identified in at least one feature and viceversa, every feature shall be linked to the corresponding Subset-026 requirements.



Figure 1: Relationship between Subset-026, feature and testcase

- 4.1.1.4** A feature shall have the following characteristics:
- a) Simplicity: Restriction to the direct stimulation and reaction at the available interfaces to a test stimulation of the test object (single cause/effect relation). The reaction is thereby a mandatory sequence of defined outputs at the available interfaces.
  - b) Independency: The test of a feature should be widely independent of all other features, which could be active at the same time. The essential functionality offers the necessary independence without taking into consideration the implementation of the feature.

### 4.2 Feature and Test case

#### 4.2.1 Introduction

- 4.2.1.1** The Subset-026 is to be used as a basis for all test cases. The principle objective of the tests is always the verification that the system requirements have been fulfilled. Proceeding from the system requirements that can be unambiguously interpreted and referred to, the step towards the test cases must be comprehensibly made via the creation of features.
- 4.2.1.2** The features in their summary or useful convergence of several requirements form an order criterion of the correlation/interaction in which the requirements will be

tested. A feature can be composed of one or several testcases, it will depend on its complexity and the coverage for the requirements of the feature.

**4.2.1.3** When creating the test cases, the creator shall always make a reference to the requirements to be proved (for traceability purpose) and to the links from the test cases to the features must be established in order to reference the tested feature.

**4.2.1.4** The test cases use the view from outside onto the test object. The test object is considered as "Black Box" with a fixed number of defined interfaces and their determined range of values. The complete interface definition can be taken from the ETCS subsets dealing with the interfaces (FFFIS or FIS) including Ss-094 [7].

**4.2.1.5** For test execution, a distinction is made between three types of events:

- a) Inputs for influencing the test sequence (IN),
- b) Outputs for evaluation of test sequence (OUT),
- c) Time events for the description of timing or sequence.

## **4.2.2 Template**

**4.2.2.1** The content of a feature and its test cases needs to be formalised in the form of a common template. The following template shall be used to prepare features and the test cases of a feature. The template lists all the possible elements, but reductions according to test cases needs are allowed:

<b>ERTMS/ETCS</b>	
<b>Test cases of Feature &lt;identifier&gt;</b>  (<designation of the feature to be tested>)  <b>Total: &lt;number&gt; Test case(s)</b>	
REF:	Subset-076-5-2-<identifier>
ISSUE:	Version <number>
DATE:	<dd/mm/yyyy>

Edited by	Quality review	Approved by
Subset-076 WG	ERA	ERA

## Modification History

Issue Number Date	Section Number	Modification / Description	Author
Version <identifier> <dd/mm/yyyy>	<section(s)>	<description>	<author>

## Test Cases

### Test case 1

IDENTIFICATION		
	Title	Unique Number
Tested Equipment	On-board equipment	
Tested Feature	<description>	<identifier>
Test Case of Feature	<description>	<identifier>
Applicable Mode/Level Combinations	< L0 / L1 / L2 / L3 / LNTC: FS/ LS/ OS/ SR/ SH/ UN/ PS / SL/ SB/ TR/ PT/ SF/ NL/ SN/ RV >	
Target of Test	<description>	
Version	<identifier>	<dd/mm/yyyy>
Author	<author>	
Based on Requirements	ERTMS/ETCS - SRS <version>	Subset-026-<requirement>

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

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METHOD OF TEST	
Method	
Constraints	

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## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

STARTING CONDITIONS (INTERNAL STATES)		
States of ERTMS/ETCS information	Status/Value	Description
ERTMS/ETCS Mode	<0/ 1/ 2/ 3/ 4/ 5/ 6/ 7/ 8/ 9/ 11/ 12/ 13/ 14/ 15>	<FS/ OS/ SR/ SH/ UN/ SL/ SB/ TR/ PT/ SF/ NL/ LS/ SN/ RV/ PS>
Radio communication session	<Established/Not established>	
National Values		
Not yet applicable National Values		
Linking		
Movement Authority		
Gradient Profile		
International SSP		
Axle load speed profile		
STM max speed		
STM system speed/distance		
Level Transition Order		
Stop Shunting on desk opening		
List of balises for SH area		
MA Request Parameters		
Position Report parameters		
List of Balises in SR Authority + SR mode speed limit and distance		
Temporary Speed Restrictions		
Inhibition of revocable TSRs from balises in L2/3		

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

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Default Gradient for TSR		
Signalling related Speed Restriction		
Route Suitability Data		
Plain Text Information (location based)		
Plain Text Information (not location based)		
Fixed Text Information (location based)		
Fixed Text Information (not location based)		
Geographical Position		
Mode Profile		
RBC Transition Order		
Radio Infill Area information		
EOLM information		
Track Conditions excluding big metal masses		
Track condition big metal masses		
Unconditional Emergency Stop		
Conditional Emergency Stop		
Train Position		
Train Data		
Adhesion factor		
ERTMS/ETCS level		
Table of priority of trackside supported levels		
Driver ID		

## EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

### ETCS TEST PLAN AND METHODOLOGY FOR SS-076

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Radio Network ID		
RBC ID/Phone Number		
Train Running Number		
Reversing Area Information		
Reversing Supervision Information		
Track Ahead Free Request		
Level Crossing information		
Permitted Braking Distance Information		
RBC/RIU System Version		
Operated System Version		
Language used to display information to the driver		
Virtual Balise Covers		
Generic LS function marker		
LSSMA display toggle on order		

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### ETCS TEST PLAN AND METHODOLOGY FOR SS-076

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REQUIRED STARTING CONDITIONS ON INTERFACES			
State of interfaces	I/O	Interface	Comments
<SAFE CONNECTION SET-UP / SAFE CONNECTION NOT SET-UP / NOT RELEVANT>	<I/O / ->	RTM	-
NOT RELEVANT	-	TIU	-
NOT RELEVANT	-	DMI	Absence of Symbol for “No connection “ status
NOT RELEVANT	-	BTM	-
NOT RELEVANT	-	INT	-

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST									
Step	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
	Levels	Modes					Levels	Modes	
1	<L0/ LNTC/ L1/ L2/ L3>	<FS/ LS / OS/ SR/ SH/ UN/ PS / SL/ SB/ TR/ PT/ SF/ NL/ / SN/ RV>					<L0/ LNTC/ L1/ L2/ L3>	<FS/ LS / OS/ SR/ SH/ UN/ PS / SL/ SB/ TR/ PT/ SF/ NL/ / SN/ RV>	
2	<L0/ LNTC/ L1/ L2/ L3>	<FS/ LS / OS/ SR/ SH/ UN/ PS / SL/ SB/ TR/ PT/ SF/ NL/ / SN/ RV>					<L0/ LNTC/ L1/ L2/ L3>	<FS/ LS / OS/ SR/ SH/ UN/ PS / SL/ SB/ TR/ PT/ SF/ NL/ / SN/ RV>	
3	N/A	N/A					N/A	N/A	
...									

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

END CONDITIONS (INTERNAL STATES)		
States of ERTMS/ETCS information	Status/Value	Description
ERTMS/ETCS Mode	<0/ 1/ 2/ 3/ 4/ 5/ 6/ 7/ 8/ 9/ 11/ 12/ 13/ 14/ 15>	<FS/ OS/ SR/ SH/ UN/ SL/ SB/ TR/ PT/ SF/ NL/ LS/ SN/ RV/ PS>
Radio communication session	<Established/Not established>	
National Values		
Not yet applicable National Values		
Linking		
Movement Authority		
Gradient Profile		
International SSP		
Axle load speed profile		
STM max speed		
STM system speed/distance		
Level Transition Order		
Stop Shunting on desk opening		
List of balises for SH area		
MA Request Parameters		
Position Report parameters		
List of Balises in SR Authority + SR mode speed limit and distance		
Temporary Speed Restrictions		
Inhibition of revocable TSRs from balises in L2/3		

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

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Default Gradient for TSR		
Signalling related Speed Restriction		
Route Suitability Data		
Plain Text Information (location based)		
Plain Text Information (not location based)		
Fixed Text Information (location based)		
Fixed Text Information (not location based)		
Geographical Position		
Mode Profile		
RBC Transition Order		
Radio Infill Area information		
EOLM information		
Track Conditions excluding big metal masses		
Track condition big metal masses		
Unconditional Emergency Stop		
Conditional Emergency Stop		
Train Position		
Train Data		
Adhesion factor		
ERTMS/ETCS level		
Table of priority of trackside supported levels		
Driver ID		

## EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

### ETCS TEST PLAN AND METHODOLOGY FOR SS-076

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Radio Network ID		
RBC ID/Phone Number		
Train Running Number		
Reversing Area Information		
Reversing Supervision Information		
Track Ahead Free Request		
Level Crossing information		
Permitted Braking Distance Information		
RBC/RIU System Version		
Operated System Version		
Language used to display information to the driver		
Virtual Balise Covers		
Generic LS function marker		
LSSMA display toggle on order		

<b>END CONDITIONS ON INTERFACES</b>			
<b>State of interfaces</b>	<b>I/O</b>	<b>Interface</b>	<b>Comments</b>
<SAFE CONNECTION SET-UP / SAFE CONNECTION NOT SET-UP / NOT RELEVANT>	<I/O / ->	RTM	-
NOT RELEVANT	-	TIU	-
NOT RELEVANT	-	DMI	Absence of Symbol for “No connection “ status
NOT RELEVANT	-	BTM	-
NOT RELEVANT	-	INT	-

#### **4.2.2.2** Handling of intentionally deleted test cases

4.2.2.2.1 For some reason, a test case may be intentionally deleted. In this case, all the test case tables will be deleted but the identification table. This identification table shall be filled like in the example below:

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

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IDENTIFICATION		
	Title	Unique Number
Tested Equipment	On-board equipment	
Tested Feature	<description>	<identifier>
Test Case of Feature	Intentionally deleted	Intentionally deleted
Applicable Mode/Level Combinations	Intentionally deleted	
Target of Test	Intentionally deleted	
Version	Intentionally deleted	Intentionally deleted
Author	Intentionally deleted	
Based on Requirements	ERTMS/ETCS - SRS <version>	Intentionally deleted

### **4.2.3 Description of the template**

**4.2.3.1** The content of the set of test cases for a feature is:

*Table 5: Template content of a feature*

<b>Abbreviation</b>	<b>Meaning</b>
Header	<ul style="list-style-type: none"> <li>• Explicit identifier of the feature to be tested</li> <li>• Designation of the feature to be tested</li> <li>• Total number of test cases to be tested</li> </ul>
Dependencies	<ul style="list-style-type: none"> <li>• Identifiers of the features, which refer to that set of test cases</li> <li>• Identifiers of the test cases, which refer to that set of test cases</li> </ul>

**4.2.3.2** The content of a specific test case is:

*Table 6: Template content of a test case*

<b>Abbreviation</b>	<b>Meaning</b>
Identification	<ul style="list-style-type: none"> <li>• Explicit number of test object</li> <li>• Designation of test object</li> <li>• Explicit number of the feature to be tested</li> <li>• Designation of the feature to be tested</li> <li>• Test case number within the feature to be tested</li> <li>• Test case name within the feature to be tested</li> <li>• Target of Test</li> <li>• Subset-026 Requirement references</li> <li>• Test case version</li> <li>• Name of author</li> </ul>
Method of test	<ul style="list-style-type: none"> <li>• Text description of test method</li> <li>• Text description of test conditions</li> </ul>
Start Conditions	<ul style="list-style-type: none"> <li>• Internal states of the test object &lt;logical information&gt; = &lt;value&gt;</li> </ul>

*Table 6: Template content of a test case*

Abbreviation	Meaning
	<ul style="list-style-type: none"> <li>States of interfaces &lt;interface information&gt; IN: Information   OUT: Information</li> </ul>
Sequence of Test	<ul style="list-style-type: none"> <li>IN: Information</li> <li>OUT: Information Information consisting of: &lt;interface&gt;.&lt;structure&gt;.&lt;timing&gt; = &lt;value&gt; &lt;interface&gt; = Designation of interface &lt;structure&gt; = Structure of information &lt;timing&gt; = buffered   unbuffered   all (all = optional)</li> <li>TIME≤: &lt;value&gt; (further sequence must occur within the defined time) TIME=: &lt;value&gt; (further sequence must exactly occur at the defined time) TIME≥: &lt;value&gt; (further sequence is allowed to occur after the defined time only)</li> </ul>
End Conditions	<ul style="list-style-type: none"> <li>Internal states of the test object &lt;logical information&gt; = &lt;value&gt;</li> <li>States of the interfaces &lt;interface information&gt; IN: Information   OUT: Information</li> </ul>

## 4.3 Inclusion of Features

**4.3.1.1** Often used functionality in several different features could be separated in own features. This offers the possibility to test them with all aspects only at once, when the specific software architecture allows that.

**4.3.1.2** This kind of feature could be part of the table “sequence of test” of a test case of another feature. The meaning is that each test case of the used feature has to be included, one at each time, in the calling test case like a subroutine (forward reference). To prove the calling test case, each combination with each test case of the used feature has to be proven.

**4.3.1.3** Clarification on how to use “Use\_F#XXX”:

- Usage: the inclusion of “Use\_F#XXX” in a TC was as restricted as possible.
- Syntax:

1. "Use\_FTXXXXXXX" (e.g. "Use\_FT3060500") when any TC could be used.
2. "Use\_FTXXXXXXX.W" (e.g. "Use\_FT3060500.1" or "Use\_FT4070201.59") when a specific TC could be used.
3. "Use\_FTXXXXXXX.W-Y,Z" (e.g. "Use\_FT3060500.4-7,9") to use TCs 4,5,6,7 or 9) when several TC could be used.

**4.3.1.4** At testing a test case with using another TC completely, the complete used TC is proved. No further testing of the used TC is necessary.

**4.3.1.5** In case that it can be proven, by using the specific software architecture, that the separated functionality is realised exactly in the same way for the calling test cases, it is not needed to make the proof by testing the same functionality again and again for all calling test cases. It is sufficiently to test each test case of the used feature at least one time. At the next calling of the used feature only one of the possible test cases of the used feature is needed to complete the calling test case.

## **4.4 Test Case design rules**

**4.4.1.1** Some steps in the "Sequence of steps" in a TC can be "optional" (and the reason for this will be added in the "Comment" field) as long as the removal of these steps in a Test Sequence does not affect the testability of any requirement in the "Based on requirements" field of the TC. For example, if a TC tests a functionality as a consequence of the reception of some information in L0/L1/L2/L3, and the transmission media of this information is not relevant for the requirements tested by means of the TC, then four different steps should be written in this TC: one BTM step and its corresponding JRU step, and one RTM step and its corresponding JRU step (in the "Comment" column a sentence like "Only for L1/L0" should be added in the first two steps and "Only for L2/L3" should be added in the last ones). Something similar could happen when trying to create (or review) a TC testing the same functionality for different modes and possibly having to add extra steps for certain modes. All this will have to be done with extreme care, in order not to miss any functionality defined by the requirements of a TC.

**4.4.1.2** The way to describe a packet sent/received in a BTM/RTM/LTM step differs following the type of packet:

- Mandatory packets are always included when the TC is implemented in a TS
  - Example: In a TC containing a switch from SR to FS, the packet 12 is mandatory
  - Way to describe in the TC: These packets must be mentioned in the sequence of steps table and described fully in the message description table
  - For a BTM/LTM step the mandatory Packet 255 does not need to be listed in the TC step description but must be included in the message table.
- Mandatory position report packet with choice between packet 0 and 1: for a list of radio messages, the inclusion of a position report is mandatory; generally,

the choice between packet 0 and packet 1 is not made at the TC level, because most of the time, no constraint requests it before the TC is implemented in a TS

- Way to describe in the TC: Packet 0 must be mentioned in the sequence of steps table and described fully in the message description table; a remark must be added in the comment column of the step and of the line NID\_PACKET to make clear that packet 1 must be used if position report is based on 2 BG
- Optional packets related to the TC are optionally included when the TC is implemented in a TS
  - Example: In a TC containing a switch from SR to FS/LS/OS, the packet 80 is optional because it is included only when the TC is implemented in a TS with the switch from SR to LS/OS, but not when the TC is implemented with the switch from SR to FS
  - Way to describe in the TC: These packets must be mentioned in the "Comment" column of the concerned step with a meaningful comment (for example: "This Packet 80 will only be sent when testing the TC in OS or LS mode"), but must not be described in the message description table
- Optional packets not related to the TC, but whose inclusion is not forbidden when the TC implemented in a TS
  - Example: In a TC whose aim is a switch from SR to FS, the packet 67 is optional and has nothing to do with the TC aim, but it is not forbidden to include it if the message sending the packet 12 (for the switch to FS) is merged with a message from another TC dealing with track conditions that sends a packet 67
  - Way to describe in the TC: These packets must not be mentioned in the sequence of steps table nor in the message description table.

**4.4.1.3** If a TC is designed to be tested in several modes and levels, it is understood that only one combination of level and mode will be used each time the TC is actually tested in a Test Sequence (and this is independent from the agreement on testing each TC at least once, and hence not being obligatory to test all the TCs in all the possible levels and modes combinations).

**4.4.1.4** If, for the proper test of a TC, one message or active button must not be acknowledged on the DMI, it is allowed not to add any "DMI/ Input" step in the "Sequence of Test" of the TC, and this will be understood as not having to acknowledge it.

**4.4.1.5** How to fill in the columns of Previous/Next - Levels/Modes from the Table "Sequence of Test": If the sequence of the test case includes (tests) a level transition and/or a Mode change, then the mentioned columns are filled in with all applicable Modes and Levels as specified in the field "Applicable Mode/Level Combinations" from table "Identification". When the event (Mode change and/or level transition) occurs then, from then on, only the applicable level and/or mode combination is showed in the columns. In the opposite case, if no event as Mode change and/or level transition occurs, then the 4 columns are filled in with the expression "N/A" (Not Applicable).

- 4.4.1.6** Chapter 6 TCs will have an extra column named M\_VERSION in order to differentiate the message version interchanged between track and train.
- 4.4.1.7** Message/Telegram description table linked to any BTM/RTM/LTM step: when it is not necessary to assign a particular value to a variable to cover the requirements of a TC, the wording "FINITE VALUE" shall be used to fill the "Value" column.
- 4.4.1.8** There should be a related JRU step added for each:
- DMI step mentioning an event for which a DMI symbol is displayed (i.e. it was not displayed before) or removed (i.e. it was displayed before)
  - TIU step mentioning a TIU I/O change of status
- 4.4.1.9** By default, a packet 255 shall be used at the end of every balise/loop telegram/message. Exception: the previous requirement shall not apply for a TC testing the reaction of the onboard equipment in the absence of packet 255 in a balise/loop telegram/message.
- 4.4.1.10** Only the testable requirements that will actually be tested in a TC have to be included in the "Based on requirements" field of the TC.
- 4.4.1.11** In chapters 7 and 8, there are many requirements linked to packets and messages that should not be considered as testable, mainly because they are repeated in many sub-chapters. So, in chapter 7, the testable requirements will be the ones in sections 7.4.2, 7.4.3, 7.4.4, and only the title ones, not the corresponding variable (for example, for the requirements under 7.4.2.1.1 only the requirement "Subset-026- 7.4.2.1.1 packet 3 National Values" will be put in the "Based on Requirements" field of a TC). Similarly, in chapter 8, the testable requirements will be the ones in the sections 8.6 and 8.7, so the field "Based on Requirements" shall include as requirements the message title and also the packets contained in it.

## 5. REQUIREMENTS COVERAGE

- 5.1.1.1 The below attached file checks each requirement is covered in at least one Test Case:



## **6. METHODOLOGY AND RULES TO PREPARE TEST SEQUENCES**

### **6.1 Purpose of test sequences**

**6.1.1.1** The purpose of building up TS is justified in the following issues: TC [5] are generic functional test units, which main purpose is to build the bridge between the Subset-026 requirements and the test specifications. However, they cannot be tested directly because:

- a) The ETCS Level and Mode are not fixed.
- b) The ETCS message description is not complete.
- c) The train movement information is just an isolated spot.
- d) The track description, in terms of track features with impact in on-board equipment interfaces (e.g. gradients, radio holes, etc), is missing.
- e) The train description is missing (for a proper train simulation).
- f) The train parameters loaded into the on-board equipment are missing.
- g) The way to bring the on-board equipment to the required starting conditions can only be done respecting the black box principle.

**6.1.1.2** TS are just an organized set of TC, where the above mentioned undefined issues are solved:

- a) The TCs are customised to a specific ETCS Level and Mode.
- b) The ETCS messages are completely defined with values selected among the appropriate values defined in the TCs according to the need of the underlying requirements.
- c) A continuous and realistic train speed profile starting and ending at standstill is defined.
- d) The track description complementary to the train speed profile is provided.
- e) The train description to build the continuous train speed profile is provided.
- f) The train parameters loaded into the on-board equipment are provided.
- g) The overall TC arrangement conforms with a fully testable scenario, where the starting and ending conditions of every TC are properly checked to match to the adjacent TC.

**6.1.1.3** Taking into account that some of the previous items (e) and f)) are only be available prior to testing and are subject to change and due to the increased number of optional functionalities to be implemented on-board, a dynamic procedure is recommended to build up the Test Sequences.

- 6.1.1.4** In order to guarantee a reliable and reproducible set of TS, this chapter shall provide clear rules to build up TS from the TC, covering the complete list of issues above mentioned.

## **6.2 General rules on test sequences**

### **6.2.1 Default values**

- 6.2.1.1** In the present section default values are defined.
- 6.2.1.2** A default value shall be used if no other value is requested by the tested requirement.
- 6.2.1.3** A default value shall be changed if another value is requested by the tested requirement.

### **6.2.2 Content**

- 6.2.2.1** A TS is a list of the events to be evaluated and validated to check the correct functioning of the on-board equipment. Other events not described in the test sequence can occur but are not used for evaluation and validation purposes.
- 6.2.2.1.1** Example: There is no need to check the record of every event in the JRU or each position report sent by the on-board equipment. This saves time when editing, running and validating the TS.
- 6.2.2.2** The TSs shall be designed according to the strategy defined in 6.3.1.
- 6.2.2.3** The objective is to obtain a set of simpler TS in which the link to the Subset-026 [2] is clearer.
- 6.2.2.4** A TS should be realistic from the engineering, operational and track layout point of view. Unrealistic circumstances are allowed for the testing of error conditions.

### **6.2.3 Length**

- 6.2.3.1** A TS shall be composed of at least one TC.
- 6.2.3.2** *To reduce testing costs (see 6.3.1.1.1), the sequences are intended to be short.* There is no upper limit for the number of TCs in a TS but the total number of steps in a TS shall be less than 400. This total number of steps shall take into account all steps in the TS including the steps related to the SoM and to the EoM.
- 6.2.3.3** Note: It is recommended to have a number of steps between 150 and 200.
- 6.2.3.4** The objective is to obtain a set of shorter TSs, avoiding the need to « cut » a TS to test its second part if the first one can't be performed.

## **6.2.4 Starting conditions of a TS**

**6.2.4.1** Pre-sequences (sequences out of the testing scope) shall not be used. In order to fulfil the starting conditions of the first Test Case of Type 3 (see 6.3.1.2) in a test sequence, harmonised procedures shall be used (see 6.3 and Annex A) by default.

**6.2.4.1.1** Note: If the train transits from NP mode with defined starting conditions, the steps to reach those conditions are part of the TS. This avoids divergences between test sequences to reach the starting conditions.

**6.2.4.2** Test sequences shall start in NP mode, never in SB mode. This allows a proper identification of the test results to be evaluated and validated in the log files.

**6.2.4.3** The TS designer shall be careful with the data stored on-board that are not deleted nor reset when entering in NP, because at the TS execution, the value of those data could be kept from the preceding TS execution.

**6.2.4.4** The data stored on-board that are unchanged when entering in NP are: National Values, Radio Network ID, Operated System Version, Virtual Balise Covers, Language used to display information to the driver (see 4.10 in Subset-026 [2]).

**6.2.4.5** The data stored on-board that are invalidated when entering in NP are: EOLM information, Train Position, ERTMS/ETCS level, Table of priority of trackside supported levels, RBC ID/Phone Number (see 4.10 in Subset-026 [2]).

**6.2.4.5.1** Those data are influenced by the Cold Movement Detection when exiting NP (optional functionality, see 4.5.2 and 4.11 in Subset-026 [2]).

**6.2.4.5.2** At the beginning of the TS, the status of the ERTMS/ETCS level information is invalid. As the value of this information depends on the last TS that was executed before, the level value shall not be used until the driver has validated it (with or without modification).

**6.2.4.6** It shall be considered default national values are used at the beginning of a TS. This is ensured by 6.2.5.1.

## **6.2.5 Ending conditions of a TS**

**6.2.5.1** If national values different from the default ones are sent in a TS, the default national values shall be sent at the end of this TS. The reason why is to avoid using other national values inherited from the previous test sequence executed in the next test sequence (see 6.2.4.6).

**6.2.5.2** A TS shall end with a switch to NP implemented by FT4060300.1.

**6.2.5.3** It is not requested to include the radio messages exchange related to the EoM to finish a TS.

**6.2.5.4** A TS shall end with the train speed at zero.

**6.2.5.5** If a generic LS function marker is stored by the on-board in a TS the marker shall be deleted again in the end.

**6.2.6 Available RBCs/RIUs**

**6.2.6.1** Each RBC/RIU used during the TS shall be listed in the available RBC/RIU section of the TS description.

**6.2.6.2** This listing shall describe each RBC/RIU with the following information:

- a) Name: A unique name in the TS shall be used to refer to each RBC/RIU: RBC1/RIU1 for the first RBC/RIU, RBC2/RIU2 for the second RBC/RIU, RBC3/RIU3 for the third RBC/RIU and RBC4/RIU4 for the fourth RBC/RIU.
- b) Country (NID\_C): see Table 17 in Subset-094 [7]
- c) RBC/RIU Identifier (NID\_RBC/NID\_RIU): see Table 16 in Subset-094 [7]
- d) RBC/RIU ETCS Identifier: see Table 16 in Subset-094 [7]
- e) Phone Number (NID\_RADIO): A fixed value shall be used: 003265342101FFFFh for first RBC/RIU, 003265342102FFFFh for the second RBC/RIU, 003265342103FFFFh for the third RBC/RIU and 003265342104FFFFh for the fourth RBC/RIU.

**6.2.6.3** NID\_RADIO (phone number) shall be set to 1500FFFFFFFFFFFFh for the use of the short number (default number for most appropriate RBC according to §9.8.4 Table 9-10 in EIRENE SRS [10]).

**6.2.7 Radio networks**

**6.2.7.1** Each radio network used during the TS shall comply with the following values:

- a) Name: A unique name shall be used to refer to each radio network: Network1 for the first network and Network2 for the second network.
- b) Identity of Radio Network (NID\_MN): 654321h for the first network and 654322h for the second network.

**6.2.7.2** In case of only one network, the identity shall be NID\_MN=654321h.

**6.2.8 Track to train information**

**6.2.8.1** Radio messages

6.2.8.1.1 Default values

6.2.8.1.1.1 T\_TRAIN (trainborne clock) shall be set to 0, but the value 0 shall not be used during the TS run, because it is not possible to know the T\_TRAIN value before the run of the TS.

6.2.8.1.2 Time/Position delays and Performances

- 6.2.8.1.2.1 Time and Position delays and performances shall follow the defined values in Table 8. They shall apply for the delays and back delays of the radio messages.
- 6.2.8.1.2.2 The delay and back delay definition is described in Figure 1. An example is given in Figure 2.
- 6.2.8.1.2.3 The presence of a back delay is not mandatory. When a back delay is used for a message, the value of the back delay shall be equal to the value of the delay of the message.

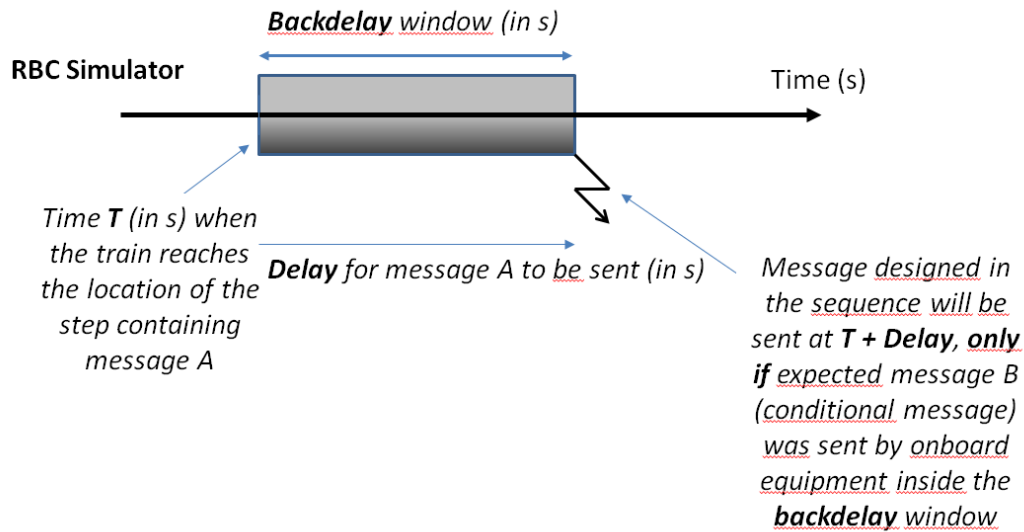
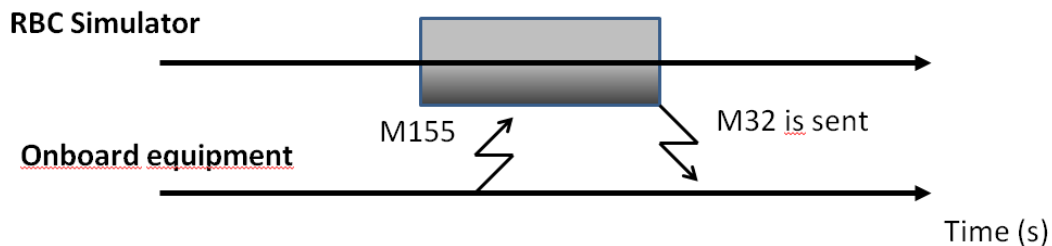


Figure 1: Delay and Back delay definition

Example 1: message 32 can be sent by RBC Simulator because onboard equipment message is in the backdelay window



Example 2: message 32 cannot be sent by RBC Simulator because onboard equipment message is not in the backdelay window

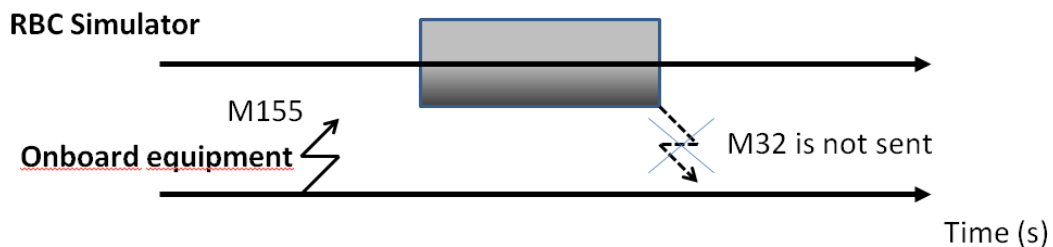


Figure 2: Delay and Back delay example

## 6.2.8.2 BG messages

### 6.2.8.2.1 BG engineering default values

6.2.8.2.1.1 Distance between 2 balises: 5m (in order to enable the good reception of telegrams even with a speed of 500 km/h according to 5.6.3 in Subset-036 [4]).

6.2.8.2.1.2 Default location accuracy of a balise group : 12 m.

6.2.8.2.1.3 The balises inside a BG shall be defined in the order in which the train will encounter them.

6.2.8.2.2 Content of messages

6.2.8.2.2.1 N\_TOTAL shall be set to 1 (two balises in the group) if more than one balise in the BG is requested.

6.2.8.2.2.2 M\_MCOUNT (message counter) shall be set to 0 or 255.

6.2.8.2.2.3 NID\_C of BG header shall be set to 64 or 352.

6.2.8.2.2.4 Q\_DIR (validity direction of transmitted data) shall be set to 1 (nominal).

6.2.8.2.2.5 By default, a packet 255 shall be used at the end of every balise telegram.

6.2.8.2.2.5.1 Exception: the previous requirement shall not apply for a TC testing the reaction of the on-board equipment in the absence of packet 255 in a balise telegram.

**6.2.8.3** Loop messages

6.2.8.3.1 Content of messages

6.2.8.3.1.1 By default, a packet 255 shall be used at the end of every loop message.

6.2.8.3.1.1.1 Exception: the previous requirement shall not apply for a TC testing the reaction of the on-board equipment in the absence of packet 255 in a loop message.

**6.2.9 Train to track information**

**6.2.9.1** Default values

6.2.9.1.1 L\_DOUBTOVER (over-reading error) shall be set to 0, but the value 0 shall not be used during the TS run, because it is not possible to know the L\_DOUBTOVER value before the run of the TS.

6.2.9.1.2 L\_DOUBTUNDER (under-reading error) shall be set to 0, but the value 0 shall not be used during the TS run, because it is not possible to know the L\_DOUBTUNDER value before the run of the TS

6.2.9.1.3 T\_TRAIN (trainborne clock) shall be set to 0, but the value 0 shall not be used during the TS run, because it is not possible to know the T\_TRAIN value before the run of the TS.

6.2.9.1.4 NID\_ENGINE (on-board ETCS identity) shall be set to 76000d.

**6.2.9.2** Report Last Relevant Balise Group

- 6.2.9.2.1 The on-board equipment shall report a Last Relevant Balise Group (LRBG) if the RBC has to use it later in the TS.

#### **6.2.10 Train parameters**

- 6.2.10.1 One important item for the design of reliable and unified TSs is the set of default train parameters to be used in a sequence. It shall follow chapter 8.

- 6.2.10.2 The default train parameters shall not be used in specific cases where other train parameters need to be entered to test some Subset-026 [2] clauses (e.g. 3.18.3.2.1).

- 6.2.10.2.1 The list of needed train parameters shall be provided by the testing laboratory to the supplier in advance of the test campaign in order to properly engineer the configurations of the OBU (train integrity device, connected mobile terminals, train model, etc.).

- 6.2.10.3 The accomplishment of braking requirements shall be verified for the two generic categories of trains: Freight and passengers trains. That requires two sets of Test Sequences for the verification of the Braking curves.

#### **6.2.11 Driver inputs**

- 6.2.11.1 Certain DMI input steps require a choice which specific input is selected by the driver, e.g. choosing a level. Such a selection shall be provided as content of the step and mentioned in the user comment.

- 6.2.11.2 When performing a Level transition to L0 and LNTC being in Trip mode, the acknowledgement of the level transition shall be performed before the acknowledgement of Trip mode (see 5.10.4.4, 5.11.2.2 S060 in [2] and 5.4.1.9 in [8]).

#### **6.2.12 Train movement**

##### **6.2.12.1 Speed**

- 6.2.12.1.1 By default, the sequence shall be run at constant speed.

- 6.2.12.1.2 A speed profile shall be specified in the sequence if the sequence is not entirely at standstill.

- 6.2.12.1.2.1 The speed profile shall describe the speed the test bench will try to provide to the on-board during the run of the sequence.

- 6.2.12.1.2.2 The decelerations resulting from the command of the brake application by the on-board equipment may slightly differ from the speed profile.

##### **6.2.12.2 Acceleration**

- 6.2.12.2.1 The acceleration curve shall follow the default parameters in Table 7.

*Table 7: Acceleration curve*

<b>Position (m)</b>	<b>Time (s)</b>	<b>Speed (m/s)</b>	<b>Speed (km/h)</b>
0	0	0	0
25	7	7	25
50	10	10	36
100	14	14	51
150	17	17	62
200	20	20	72
300	24	24	88
400	28	28	102
500	32	32	114
600	35	35	125
700	37	37	135
800	40	40	144
900	42	42	153
1000	45	45	161
1200	49	49	176
1400	53	53	190
1600	57	57	204
1800	60	60	216
2000	63	63	228
2200	66	66	239
2400	69	69	249
2600	72	72	260
2800	75	75	269
3000	77	77	279
3200	80	80	288
3400	82	82	297
3600	85	85	305
3800	87	87	314
4000	89	89	322

### **6.2.12.3 Deceleration and brakes**

6.2.12.3.1 For the decelerations, please refer to A.3.2, A.3.7, A.3.8, A.3.9 in Subset-026 [2] and use the ERA Braking Curves Simulation Tool [9].

### **6.2.12.3.2 Delays**

6.2.12.3.3 Delays shall follow the default values in Table 8.

*Table 8: Delays*

Task				Timing
Description	Start Event	End Event	Level	Speed Profile
Set-up radio connection (501/506)	On-board equipment sends Msg 501	On-board equipment receives Msg 506	All	10s
Release radio connection (502/508)	On-board equipment sends Msg 502	On-board equipment receives Msg 508	All	10s
Msg exchange (X/Y) where (X/Y) is (155/32), (157/43 41 40), (129/8), (132/3), (156/39), (130/28) or (136/6)	On-board equipment sends Msg X	On-board equipment receives Msg Y	All	5s
MA Request timeout	On-board equipment sends Msg 132	Timer expires	L2/L3	60s
Entering new Driver ID or Train running number	Driver ID or Train running number window is available	Driver ID or Train running number entered	All	10s
Entering new RBC ID & Phone number	Driver selects "Enter RBC data" window	RBC data entry completed	L2/L3	30s
Entering new train data	Driver selects "Train data"	Train data entry completed	All	20s
Validating existing data (Driver ID, Train running number, RBC ID & Phone number)	Data entry window is available	Data validated	All	5s
Validating existing Train data	Train Data entry window is available	Train Data validated	All	10s
Start of Mission L0/LNTC/L1	Driver ID window is displayed	On-board equipment is in L0/UN or LNTC/SN or L1/SR	L0/L1/LNTC	50s

Task				Timing
Start of Mission L2/L3	Driver ID window is displayed	On-board equipment is in L2/FS or L3/FS	L2/L3	120s
Driver selection time	A button is enabled	Driver selects the button	All	5s
Driver checks a button is enabled	A button is enabled	Driver checked the button is enabled	All	5s
Driver checks all buttons are selectable			All	30s
Brake release time	On-board equipment receives Msg 2, Msg 3 or Driver acknowledgment	On-board equipment releases brakes	L2/L3	5s
Tolerance on the standstill position after braking	The train overpasses the standstill absolute distance defined in the TS step	The train reaches standstill	All	10s
Driver opens/closes the desk	The last event before opening/closing the desk occurs	The desk is open/closed	All	5s

#### **6.2.12.4 Step distance**

6.2.12.4.1.1 The distance specified at each step shall correspond to the travelled distance the odometer is transmitting to the on-board when the step event occurs: intentional errors in the distance, for example due to slippery rails, can so be introduced for specific test purposes. Exception: Steps related to the exchange of radio messages that contain delays.

6.2.12.4.1.2 Exception: Steps which are immediate consequences of a previous step shall be placed at the same distance, ignoring any uncertain (e.g. internal computation, juridical recordings) or inherent (e.g. reaching the second balise of a group) delay of the event. This rule does not apply to DMI input steps.

6.2.12.4.2 A forward movement of the train related to the first cab open in the sequence shall induce increments of step distance.

6.2.12.4.2.1 If two cabs are defined in a sequence, a forward movement of the train related to the second cab shall induce decrements of step distance.

6.2.12.4.3 In each step it may be specified which – physical or virtual – point of the train (that is one of @MinFront, @MaxFront, @MinAnt, @MaxAnt, @EstAnt, @MinRear) has reached the distance. If no information is given the step is considered to refer to the estimated front end.

6.2.12.4.3.1 Exception: For BTM steps, the balise telegram of the location reference balise has to be sent when the balise antenna reaches the location defined in the step.

### **6.2.13 TSs for testing braking curves**

**6.2.13.1** If a Test Case aims to test explicitly any supervision limit defined in the chapter 3.13 of Subset-026 [2], the Test Sequence where this TC is tested will be designed using an appropriate tool for the calculation of the braking curves (the ERA tool [9] by default).

**6.2.13.2** The train parameters (including the different brake parameters) that will be introduced in the ERA tool will be the ones defined in section 8.3 both for Gamma and Lambda trains.

**6.2.13.3** The track parameters and the National Values will be chosen freely as long as they respect the design constraints mentioned in the corresponding Test Cases.

**6.2.13.4** The resulting curves will be used to set the different locations where the events will be checked in the Test Sequences (see the Annex B for an example).

**6.2.13.5** Note: the resulting curves will also be used to design some of the curves in the Speed Profile of the TSs.

### **6.2.14 Train integrity device**

**6.2.14.1** The default value for the integrity device is "information not available" (see M\_TRAININTEGRITY\_ST in SS094-8.3.3.36).

6.2.14.1.1 Exception: the previous requirement shall not apply for a L3 test sequence.

## **6.3 Cover a test case in a test sequence**

### **6.3.1 Test case coverage strategy**

#### **6.3.1.1 Introduction**

6.3.1.1.1 The multiple uses of the same TC shall be minimised by means of a convenient design of every TS. The reason is to reduce the testing time and the waste of resources.

6.3.1.1.2 Each TC belongs to a feature and each feature is related to a section of Subset-026 [2] (see Subset-076-5-2 [5]).

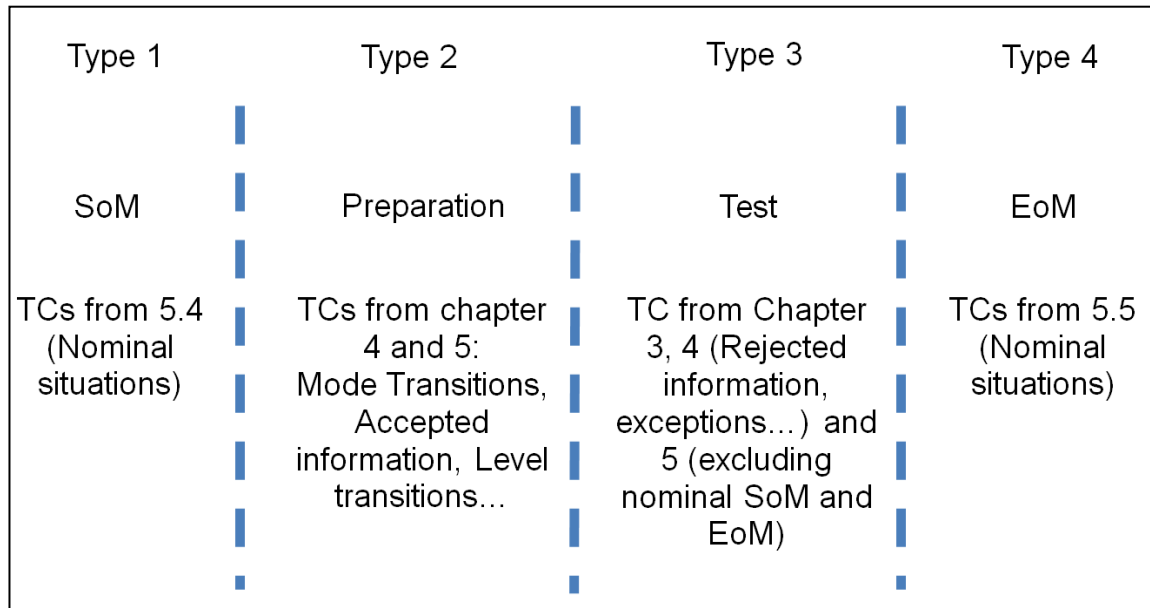
6.3.1.1.3 For each section of Subset-026, Table 9 defines a Type and a coverage strategy that applies to the TCs of the features related to this section.

*Table 9: Sections overview*

Chapter number	Section	Type	Comment	Coverage Strategy
3	3.4	3		Dedicated TS
3	3.5	1 , 2 , 3 , 4	Radio Communication	Scattered
3	3.6-3.12	3		Dedicated TS
3	3.13	3	Braking curves	Dedicated TS
3	3.14-3.20	3		Dedicated TS
3	A.3.1-A.3.10	3		Dedicated TS or Scattered
4	4.4	3		Dedicated TS
4	4.5	3		Scattered
4	4.6	2	Mode Transition	Scattered
4	4.7	3	DMI display	Scattered
4	4.8	2 , 3	Reception of information	Dedicated TS or Scattered
4	4.9	3		Scattered
4	4.10	3		Dedicated TS or Scattered
4	4.11	3		Scattered
5	5.4	1	SoM	Scattered
5	5.5	4	EoM	Scattered
5	5.6-5.9	3		Dedicated TS
5	5.10	2	Level Transition	Scattered
5	5.11	3 , 4	Trip	Dedicated TS or Scattered
5	5.12-5.19	3		Dedicated TS
6	6.6	3	Older system versions	Dedicated TS
7	7.3-7.5	3	Language	Dedicated TS or Scattered
8	8.4-8.7	3	Messages	Dedicated TS or Scattered

### 6.3.1.2 Test case type

6.3.1.2.1 In Table 9, the Type column classifies the TCs following the context of their application as described in Figure 3.



*Figure 3: Test Sequences Structure (Typology N)*

### 6.3.1.3 Section coverage strategy

6.3.1.3.1 In Table 9, the coverage strategy column defines the strategy to be applied to introduce a TC in a TS:

- a) Dedicated TS: The TCs are covered in one or several dedicated TSs
- b) Scattered: The TCs are scattered to be covered in the entire set of TSs
- c) Dedicated TS or Scattered: Both solutions apply

6.3.1.3.1.1 Exception: The TCs testing any of the euroloop, RIU, Level 3, Level NTC or Cold Movement Detection functionalities shall be introduced in dedicated TSs. The designer of these dedicated TSs shall check whether there are requirements in those TCs that are not related to any of the euroloop, RIU, Level 3, Level NTC or Cold Movement Detection functionalities. If this is the case, the designer shall ensure these requirements are tested in other TCs that do not test the euroloop, RIU, Level 3, Level NTC or Cold Movement Detection functionalities.

### 6.3.1.4 Generic test sequence build-up process

6.3.1.4.1 The TS designer shall follow the following process (see Figure 3) to build-up the TSs:

- a) Select one Type 3 TC
- b) Select level and mode for this TC
- c) Select Type 1 TCs compatible with the level under choice
- d) Select Type 2 TCs driving the on-board equipment to the selected mode and required starting conditions in Type 3 TC

- e) Not mandatory: select Type 4 TCs compatible with ending conditions in Type 3 TC
- f) Fix the train description (compatible with chapter 8)
- g) Fix the train parameters (compatible with 8)
- h) Fix the track description (compatible with train description and Type 3 TC requests)
- i) Build up the train speed profile (compatible with train and track description and Type 3 TC requests)
- j) Assign location (and time) information to every step of the TS (compatible with train speed profile)
- k) Complete "Input" messages (compatible to previous sets of information)

6.3.1.4.2 If possible, the TS designer shall include several Type 3 TCs in the same TS. Each Type 3 TC requires to be preceded by Type 2 TCs driving the on-board equipment to the selected mode and level and to the required starting conditions in the Type 3 TC.

## **6.3.2 Introducing a TC**

### **6.3.2.1 Nominal TCs**

6.3.2.1.1 In the TS, to cover a TC A, it is usually necessary to include before it a TC B that is used to set the on-board equipment in the starting conditions of TC A. It often happens TC B is already covered in another TS. This is the case e.g. for the TC that are used for the SoM and that are necessary for each TS. In such situation, the TC B with the minimum number of steps out of all the TC B that would be suitable for preceding TC A shall be chosen.

6.3.2.1.2 This is done by defining a list of "Nominal TCs" to be used in a list of situations:

- a) When drafting the beginning of a TS, the default SoMs specified in Annex A shall be used by default. These harmonised procedures avoid unnecessary checks on the DMI and repetition of radio messages. This saves time when editing, running and validating the TSs. The default SoMs are options taken from the SoM procedure flowchart (5.4.4 in [2]) and used by default. E.g. Default SoM in L2 consists in a default SoM in L1 followed by the reception of orders to contact RBC and to switch to L2. This does not prevent that the different SoM possibilities will be tested among the set of TSs of [6].
- b) The sending of an empty BG requested e.g. for the reset of odometry.

### **6.3.2.2 Coverage of a TC**

6.3.2.2.1 The coverage of the entire set of TCs is ensured in chapter 7.

- 6.3.2.2.2 One inclusion of any TC in a TS is sufficient to cover the concerned TC, i.e. to cover every requirement of the TC. Thus each TC shall be included at least once in a TS with all its steps.
- 6.3.2.2.2.1 Exception: A TC is considered as covered if it is included in a TS with all its steps but steps removed for a reason described in 6.3.2.2.5, 6.3.2.2.7 or 6.3.3.1.3. The steps removed during the design are not taken into account during the execution nor validation.
- 6.3.2.2.3 If a TC is designed to be tested in several modes and levels, there is no obligation to test it in all the possible levels and modes combinations.
- 6.3.2.2.4 To cover a TC Y, it shall be first checked if this TC Y appears in a "Use\_FTXXXXXXX.Y" (where XXXXXXXX is the feature number and Y is the TC number) to cover TC Y during this "Use\_FTXXXXXXX.Y". This reduces unnecessary redundancy.
- 6.3.2.2.5 Some steps in the "Sequence of steps" in a TC are "optional" as long as the removal of these steps in a TS does not affect the coverage of any requirement in the "Based on requirements" field of the TC.
- 6.3.2.2.5.1 Example: An "optional" step is removed from the TS if the mode or level chosen for the TS makes it not applicable.
- 6.3.2.2.5.2 The reason for removal shall be specified starting with the syntax "OPTIONAL\_STEP".
- 6.3.2.2.6 When it is absolutely needed for the TS design, the removal of a step from a TC in a TS for another reason than the ones mentioned in 6.3.2.2.5, 6.3.2.2.7 and 6.3.3.1.3 is allowed as long as the TC is covered somewhere else.
- 6.3.2.2.6.1 The reason for removal shall be specified starting with the syntax "INCOMPATIBLE\_STEP".
- 6.3.2.2.7 Some TCs need to use other TCs (they are identified in the steps with the clause "Use\_FTXXXXXXX" where XXXXXXXX is the feature number) to cover their requirements. In this case, when drafting a sequence, the complete list of the requirements of the TC shall be covered (e.g. 4.10 and A.3.4 in Subset-026 [2]).
- 6.3.2.2.7.1.1 If a TC is used instead of a step, this step shall be removed from the TS. The reason for removal shall be specified starting with the syntax "Use\_FTXXXXXXX.Y" where XXXXXXXX is the feature number and Y is the TC number. This identifies the TC used instead of the removed step.
- 6.3.2.2.7.1.2 The TS step number of the first step of the TC used instead of the removed step shall be specified in the "Replacing Step" field.
- 6.3.2.2.7.2 Example: In Table 20: Default process to use to reach L2, the step 55 "Use\_FT4080401.1" (FT3050300.22 Step 13) does not appear because it is

removed. The reason why is that the TC 1 of FT4080401 is used instead. The reason for removal starts with “Use\_FT4080401.1” and the “Replacing Step” mentions 56 that is the TS step where the first step of FT4080401.1 is included.

- 6.3.2.2.8 A BTM, LTM or RTM step shall contain all packets given in the step description. Further optional packets may be added if they do not interfere with the TC. Such an inclusion shall be described in the comment or in the user comment of the step.
- 6.3.2.2.9 If a step is described in a TC in such a way that the tested situation in the TS is ambiguous, a comment shall be added to the TS to clarify the situation.

### 6.3.3 Concatenation of TC

- 6.3.3.1.1 When a TC B is concatenated at the end to a TC A, the designer shall check the ending conditions of TC A match the starting conditions of TC B.
  - 6.3.3.1.1.1 This always includes at least checking that the level/mode combination implemented in the TS at the end of TC A is the same as the one implemented at the start of TC B. Moreover, this level/mode combination shall be allowed in the starting/ending conditions tables at the end of TC A as well as at the start of TC B.
  - 6.3.3.1.1.2 Similar checks on other information shall be necessary when the starting/ending conditions of the TC are not limited to the level/mode combination.
- 6.3.3.1.2 When a TC is concatenated to another, if there are BTM/RTM steps in each TC that are able to be merged together, they shall be merged instead of removing one of the 2 steps. One of the two related JRU steps shall be removed with the reason starting with the syntax “DUPLICATE\_OF\_FTXXXXXXX.Y.Z” (see 6.3.3.1.3). This ensures a full coverage of all the steps of the 2 concatenated TCs.
  - 6.3.3.1.2.1 Example: In Table 20, the BTM step 39 (FT5100100.37 Step 1) is merged with the BTM step 41 (FT3050300.22 Step 1). This means both steps refer to the same balise group message. This message is described in

Step 10: DMI Events Distance 0.00 m		
Event Id.	Event Name	Data
29	Request Change Level	LEVEL=0

- 6.3.3.1.2.2 Table 22 and Table 23.

Step 10: DMI Events Distance 0.00 m		
Event Id.	Event Name	Data
29	Request Change Level	LEVEL=0

- 6.3.3.1.2.3 Table 22 specifies the telegram of the first balise that contains a packet 41 requested by the step 39 of Table 20 and a packet 42 requested by the step 44 of Table 20.
- 6.3.3.1.3 When a TC is concatenated to another, if there is a step in a TC that is duplicated in the other TC, one of the 2 steps shall be removed from the TS. The reason for removal shall be specified starting with the syntax “DUPLICATE\_OF\_FTXXXXXXX.Y.Z” where XXXXXXXX is the feature number, Y is the TC number, and Z is the step number in the TC. This identifies the step that

replaces the removed step. The TS step number that replaces the removed step shall be specified in the “Replacing Step” field.

- 6.3.3.1.3.1 Example: In Table 16, the DMI step 33 “The Mode symbol ‘Acknowledge Unfitted’ is displayed” (FT4060300.58.1) does not appear because it is removed. The reason why is that step 33 is a duplicate of the DMI step 31 “An acknowledgement request for running in Unfitted mode is displayed on the DMI” (FT5040300.27.3). As the content of step 33 is encompassed by the content of step 31, the step 33 is removed from the test sequence. The reason for removal starts with “DUPLICATE\_OF\_FT5040300.27.3” and the “Replacing Step” mentions 31. This ensures a full coverage of all the steps of the 2 concatenated TCs.
- 6.3.3.1.4 Single steps are steps not included in the TCs and not covering any requirement of the Subset-026. Single steps shall not be used to draft TSs because they are not considered to be part of the TCs [5].

## 7. TEST CASES COVERAGE

- 7.1.1.1 The below attached file checks each test case is covered in at least one test sequence.



srs340\_TC\_by\_TS\_coverage.xlsx

- 7.1.1.2 The necessary conditions to ensure a test case is covered in a sequence are defined in section 6.3.2.2.

## 8. TRAIN PARAMETERS FOR TEST SEQUENCES

### 8.1 Introduction

**8.1.1.1** This chapter describes the train parameters which shall be used for the test sequences specified in [6].

**8.1.1.2** The reference lab (using an architecture according to [7]) which will be used for running the test sequences shall be able to simulate the train behaviour according to the train parameters specified within this document.

### 8.2 Generic train data set

**8.2.1.1** By default, the on-board equipment under test shall respect the generic train data set specified in Table 10.

**8.2.1.2** Note: It should be possible to acquire optionally the brake percentage as train data (see Subset-026 3.13.3.2.2). Input value in such a case: M\_BRAKE\_PERCENTAGE = 100.

*Table 10: Generic train data set*

Variable	Value
MAXIMUM TRAIN SPEED	400 km/h (V_MAXTRAIN=80)
CANT DEFICIENCY TRAIN CATEGORY	Cant Deficiency 225 mm (NC_CDTRAIN=7)
OTHER INTERNATIONAL TRAIN CATEGORY	Passenger train (NC_TRAIN=4)
TRAIN LENGTH	40 m (L_TRAIN=40)
TRACTION CUT-OFF TIME DELAY	0 s (T_TRACTION_CUT_OFF=0)
BRAKE POSITION	Passenger train in P (M_BRAKE_POSITION=0)
NOMINAL ROTATING MASS OF THE TRAIN	Unknown (M_NOM_ROT_MASS=16)
Q_TRACTIONCUTOFFINTERFACE	1 (Implemented)

*Table 10: Generic train data set*

Variable	Value
Q_SERVICEBRAKEINTERFACE	1 (Implemented)
Q_SERVICEBRAKEFEEDBACK	1 (Implemented)
QUALIFIER FOR GAMMA/LAMBDA DISCRIMINATION	Gamma type: all other captures (Q_BRAKE_CAPT_TYPE=1)
SPECIAL BRAKES CONFIGURATION NUMBER	1 (no iteration due to N_BRAKE_CONF)
EMERGENCY BRAKE DELAY TIME	2.5 s (T_BRAKE_EMERGENCY(k)=50)
NUMBER OF EMERGENCY BRAKE SECTIONS	1 (N_BRAKE_SECTIONS=1)
EMERGENCY BRAKE DECELERATION COMPONENT	1 m/s <sup>2</sup> (A_BRAKE_EMERGENCY_COMP(k,m)=100)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 50%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 0)=20)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 90%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 1)=20)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 2)=20)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 3)=20)

*Table 10: Generic train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 4)=20)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 5)=20)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 6)=20)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99999%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 7)=20)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999999%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 8)=20)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999999%	1 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(k, m), 9)=20)
ROLLING STOCK CORRECTION FACTOR ON WET RAIL	1 (M_KWET_RST(A_BRAKE_EMERGENCY_COMP(k, m))=20)
SERVICE BRAKE DELAY TIME	2.5 s (T_BRAKE_SERVICE(k)=50)
NUMBER OF SERVICE BRAKE SECTIONS	1 (N_BRAKE_SECTIONS=1)
SERVICE BRAKE DECELERATION COMPONENT	1 m/s <sup>2</sup>  (A_BRAKE_SERVICE_COMP(k,m)=100)

*Table 10: Generic train data set*

Variable	Value
LOADING GAUGE	G1 (M_LOADINGGAUGE=1)
AXLE LOAD CATEGORY	D2 (M_AXLELOADCAT=7) (20 t < Axle Load ≤ 22.5 t)
TRACTION SYSTEM VOLTAGE	DC 3 kV (M_VOLTAGE=3)
COUNTRY IDENTIFIER OF THE TRACTION SYSTEM	Spain, conventional lines 220 km/h, 3 kV DC (NID_CTRACTION=15)
AIRTIGHT SYSTEM	FITTED (M_AIRTIGHT=1)
LIST OF NATIONAL SYSTEMS AVAILABLE ON-BOARD	ASFA AVE (NID_NTC=2) and LZB Spain (NID_NTC=3)
AXLE NUMBER	4 (N_AXLE=4)

## **8.3 Train data sets for braking curves test sequences**

### **8.3.1 Introduction**

**8.3.1.1** Apart from the generic train data set defined in Table 10, the on-board equipment under test shall respect the train data set specified in Table 11, Table 12, Table 13 and Table 14 and for the applicable test sequences testing the braking curves.

### **8.3.2 Braking curves Gamma 1 train data set**

**8.3.2.1** This set includes the parameters for the braking model for a Gamma train.

**8.3.2.2** Note: It should be possible to acquire optionally the brake percentage as train data (see Subset-026 3.13.3.2.2). Input value in such a case: M\_BRAKE\_PERCENTAGE = 100.

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
MAXIMUM TRAIN SPEED	400 km/h (V_MAXTRAIN=80)
CANT DEFICIENCY TRAIN CATEGORY	Cant Deficiency 225 mm (NC_CDTRAIN=7)
OTHER INTERNATIONAL TRAIN CATEGORY	Passenger train (NC_TRAIN=4)
TRAIN LENGTH	200 m (L_TRAIN=200)
TRACTION CUT-OFF TIME DELAY	0,5 s (T_TRACTION_CUT_OFF=110010b)
BRAKE POSITION	Passenger train in P (M_BRAKE_POSITION=0)
NOMINAL ROTATING MASS OF THE TRAIN	Unknown (M_NOM_ROT_MASS=16)
M_REGENERATIVEBRAKE	11(Interface exists and affects EB and SB)
M_EDDYCURRENTBRAKE	11(Interface exists and affects EB and SB)
M_MAGNETICSHOEBRAKE	01(Interface exists and affects only EB)
M_ELECTROPNEUMATICBRAKE	00(No interface)
Q_TRACTIONCUTOFFINTERFACE	1 (Implemented)
Q_SERVICEBRAKEINTERFACE	1 (Implemented)
Q_SERVICEBRAKEFEEDBACK	1 (Implemented)
QUALIFIER FOR GAMMA/LAMBDA DISCRIMINATION	Gamma type: all other captures (Q_BRAKE_CAPT_TYPE=1)

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
SPECIAL BRAKES CONFIGURATION NUMBER	4 (N_BRAKE_CONF = 3)
SPECIFIC SPECIAL BRAKES CONFIGURATION FOR GAMMA TRAINS	<p>M_BRAKE_GAMMA_CONF(1) = 0111</p> <p>(Regenerative brake interface exists and status is active</p> <p>Eddy current brake interface exists and status is active</p> <p>Magnetic shoe brake interface exists and status is active</p> <p>Ep brake: no interface exists)</p>
EMERGENCY BRAKE DELAY TIME	2.5 s (T_BRAKE_EMERGENCY(1)=50)
NUMBER OF EMERGENCY BRAKE SECTIONS	<p>1</p> <p>(N_BRAKE_SECTIONS(1)=1)</p>
EMERGENCY BRAKE DECELERATION COMPONENT (1)	<p>1 m/s<sup>2</sup></p> <p>(A_BRAKE_EMERGENCY_COMP(1,1)=100)</p>
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 50%	<p>0,5</p> <p>(M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 0)=10)</p>
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 90%	<p>0,6</p> <p>(M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 1)=12)</p>
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99%	<p>0,8</p> <p>(M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 2)=16)</p>

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 3)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 4)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 5)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 6)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 7)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 8)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 9)=16)
ROLLING STOCK CORRECTION FACTOR ON WET RAIL	0,8 (M_KWET_RST(A_BRAKE_EMERGENCY_COMP(1, 1))=16)
SERVICE BRAKE DELAY TIME	2,5 s (T_BRAKE_SERVICE(1)=50)

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
NUMBER OF SERVICE BRAKE SECTIONS	2 (N_BRAKE_SECTIONS(1)=2)
SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_SERVICE_COMP(1,1)=0)
SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_SERVICE_COMP(1,2)=100)
SERVICE BRAKE DECELERATION COMPONENT (1)	0,8 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(1,1)=80)
SERVICE BRAKE DECELERATION COMPONENT (2)	0,6 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(1,2)=60)
NUMBER OF NORMAL SERVICE BRAKE SECTIONS	2 (N_BRAKE_NORMAL_SERVICE_SECTIONS(1)=2)
NORMAL SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_NORMAL_SERVICE_COMP(1,1)=0)
NORMAL SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_NORMAL_SERVICE_COMP(1,2)=100)
NORMAL SERVICE BRAKE DECELERATION COMPONENT (1)	0,5 m/s <sup>2</sup> (A_BRAKE_NORMAL_SERVICE_COMP(1,1)=50)
NORMAL SERVICE BRAKE DECELERATION COMPONENT (2)	0,3 m/s <sup>2</sup> (A_BRAKE_NORMAL_SERVICE_COMP(1,2)=30)
SPECIFIC SPECIAL BRAKES CONFIGURATION FOR GAMMA TRAINS	M_BRAKE_GAMMA_CONF(2) = 0101  (Regenerative brake interface exists and status is active)

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
	<p>Eddy current brake interface exists and status is inactive</p> <p>Magnetic shoe brake interface exists and status is active</p> <p>Ep brake: no interface exists)</p>
EMERGENCY BRAKE DELAY TIME	2,5 s (T_BRAKE_EMERGENCY(2)=50)
NUMBER OF EMERGENCY BRAKE SECTIONS	<p>1</p> <p>(N_BRAKE_SECTIONS(2)=1)</p>
EMERGENCY BRAKE DECELERATION COMPONENT (1)	<p>0,8 m/s<sup>2</sup></p> <p>(A_BRAKE_EMERGENCY_COMP(2,1)=80)</p>
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 50%	<p>0,5</p> <p>(M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 0)=10)</p>
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 90%	<p>0,6</p> <p>(M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 1)=12)</p>
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99%	<p>0,8</p> <p>(M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 2)=16)</p>
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9%	<p>0,8</p> <p>(M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 3)=16)</p>
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99%	<p>0,8</p> <p>(M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 4)=16)</p>

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 5)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 6)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 7)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 8)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(2, 1), 9)=16)
ROLLING STOCK CORRECTION FACTOR ON WET RAIL	0,8 (M_KWET_RST(A_BRAKE_EMERGENCY_COMP(2, 1))=16)
SERVICE BRAKE DELAY TIME	2,5 s (T_BRAKE_SERVICE(2)=50)
NUMBER OF SERVICE BRAKE SECTIONS	2 (N_BRAKE_SECTIONS(2)=2)
SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_SERVICE_COMP(2,1)=0)
SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_SERVICE_COMP(2,2)=100)

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
SERVICE BRAKE DECELERATION COMPONENT (1)	0,6 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(2,1)=60)
SERVICE BRAKE DECELERATION COMPONENT (2)	0,4 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(2,2)=40)
NUMBER OF NORMAL SERVICE BRAKE SECTIONS	2 (N_BRAKE_NORMAL_SERVICE_SECTIONS(1)=2)
NORMAL SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_NORMAL_SERVICE_COMP(1,1)=0)
NORMAL SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_NORMAL_SERVICE_COMP(1,2)=100)
NORMAL SERVICE BRAKE DECELERATION COMPONENT (1)	0,4 m/s <sup>2</sup> (A_BRAKE_NORMAL_SERVICE_COMP(1,1)=40)
NORMAL SERVICE BRAKE DECELERATION COMPONENT (2)	0,25 m/s <sup>2</sup> (A_BRAKE_NORMAL_SERVICE_COMP(1,2)=25)
SPECIFIC SPECIAL BRAKES CONFIGURATION FOR GAMMA TRAINS	M_BRAKE_GAMMA_CONF(3) = 0110  (Regenerative brake interface exists and status is inactive  Eddy current brake interface exists and status is active  Magnetic shoe brake interface exists and status is active  Ep brake: no interface exists)
EMERGENCY BRAKE DELAY TIME	2,5 s (T_BRAKE_EMERGENCY(3)=50)
NUMBER OF EMERGENCY BRAKE SECTIONS	1

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
	(N_BRAKE_SECTIONS(3)=1)
EMERGENCY BRAKE DECELERATION COMPONENT (1)	0,4 m/s <sup>2</sup> (A_BRAKE_EMERGENCY_COMP(3,1)=40)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 50%	0,5 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 0)=10)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 90%	0,6 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 1)=12)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 2)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 3)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 4)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 5)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 6)=16)

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 7)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 8)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(3, 1), 9)=16)
ROLLING STOCK CORRECTION FACTOR ON WET RAIL	0,8 (M_KWET_RST(A_BRAKE_EMERGENCY_COMP(3, 1))=16)
SERVICE BRAKE DELAY TIME	2,5 s (T_BRAKE_SERVICE(3)=50)
NUMBER OF SERVICE BRAKE SECTIONS	2 (N_BRAKE_SECTIONS(3)=2)
SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_SERVICE_COMP(3,1)=0)
SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_SERVICE_COMP(3,2)=100)
SERVICE BRAKE DECELERATION COMPONENT (1)	0,6 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(3,1)=60)
SERVICE BRAKE DECELERATION COMPONENT (2)	0,4 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(3,2)=40)
NUMBER OF NORMAL SERVICE BRAKE SECTIONS	2

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
	(N_BRAKE_NORMAL_SERVICE_SECTIONS(1)=2)
NORMAL SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_NORMAL_SERVICE_COMP(1,1)=0)
NORMAL SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_NORMAL_SERVICE_COMP(1,2)=100)
NORMAL SERVICE BRAKE DECELERATION COMPONENT (1)	0,4 m/s <sup>2</sup> (A_BRAKE_NORMAL_SERVICE_COMP(1,1)=40)
NORMAL SERVICE BRAKE DECELERATION COMPONENT (2)	0,25 m/s <sup>2</sup> (A_BRAKE_NORMAL_SERVICE_COMP(1,2)=25)
SPECIFIC SPECIAL BRAKES CONFIGURATION FOR GAMMA TRAINS	M_BRAKE_GAMMA_CONF(4) = 0011  (Regenerative brake interface exists and status is active  Eddy current brake interface exists and status is active  Magnetic shoe brake interface exists and status is inactive  Ep brake: no interface exists)
EMERGENCY BRAKE DELAY TIME	2,5 s (T_BRAKE_EMERGENCY(4)=50)
NUMBER OF EMERGENCY BRAKE SECTIONS	1 (N_BRAKE_SECTIONS(4)=1)
EMERGENCY BRAKE DECELERATION COMPONENT (1)	0,6 m/s <sup>2</sup> (A_BRAKE_EMERGENCY_COMP(4,1)=60)

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 50%	0,5 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 0)=10)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 90%	0,6 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 1)=12)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 2)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 3)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 4)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 5)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 6)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 7)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 8)=16)

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(4, 1), 9)=16)
ROLLING STOCK CORRECTION FACTOR ON WET RAIL	0,8 (M_KWET_RST(A_BRAKE_EMERGENCY_COMP(4, 1))=16)
SERVICE BRAKE DELAY TIME	2,5 s (T_BRAKE_SERVICE(4)=50)
NUMBER OF SERVICE BRAKE SECTIONS	2 (N_BRAKE_SECTIONS(4)=2)
SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_SERVICE_COMP(4,1)=0)
SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_SERVICE_COMP(4,2)=100)
SERVICE BRAKE DECELERATION COMPONENT (1)	0,6 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(4,1)=60)
SERVICE BRAKE DECELERATION COMPONENT (2)	0,4 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(4,2)=40)
NUMBER OF NORMAL SERVICE BRAKE SECTIONS	2 (N_BRAKE_NORMAL_SERVICE_SECTIONS(1)=2)
NORMAL SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_NORMAL_SERVICE_COMP(1,1)=0)
NORMAL SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_NORMAL_SERVICE_COMP(1,2)=100)

*Table 11: Braking curves Gamma 1 train data set*

Variable	Value
NORMAL SERVICE BRAKE DECELERATION COMPONENT (1)	0,4 m/s <sup>2</sup> (A_BRAKE_NORMAL_SERVICE_COMP(1,1)=40)
NORMAL SERVICE BRAKE DECELERATION COMPONENT (2)	0,25 m/s <sup>2</sup> (A_BRAKE_NORMAL_SERVICE_COMP(1,2)=25)
LOADING GAUGE	G1 (M_LOADINGGAUGE=1)
AXLE LOAD CATEGORY	D2 (M_AXLELOADCAT=7)  (20 t < Axle Load ≤ 22.5 t)
TRACTION SYSTEM VOLTAGE	AC 25 kV 50 Hz (M_VOLTAGE=1)
COUNTRY IDENTIFIER OF THE TRACTION SYSTEM	Spain, high speed lines, 25 kV AC 50 Hz, 1600/1950 mm (NID_CTRACTION=17)
AIRTIGHT SYSTEM	FITTED (M_AIRTIGHT=1)
LIST OF NATIONAL SYSTEMS AVAILABLE ON-BOARD	None
AXLE NUMBER	32 (N_AXLE=32)
CORRECTION FACTOR FOR POSITIVE GRADIENTS	Kn+(V) = 2.0
CORRECTION FACTOR FOR NEGATIVE GRADIENTS	Kn-(V) = 2.0

### **8.3.3 Braking curves Lambda 1 train data set**

**8.3.3.1** This set includes the parameters for the braking model for a Lambda train.

*Table 12: Braking curves Lambda 1 train data set*

Variable	Value
MAXIMUM TRAIN SPEED	200 km/h (V_MAXTRAIN=40)
CANT DEFICIENCY TRAIN CATEGORY	Cant Deficiency 150 mm (NC_CDTRAIN=3)
OTHER INTERNATIONAL TRAIN CATEGORY	Freight train braked in "P" (NC_TRAIN=1)
TRAIN LENGTH	750 m (L_TRAIN=750)
TRACTION CUT-OFF TIME DELAY	0,5 s (T_TRACTION_CUT_OFF=110010b)
BRAKE POSITION	Freight train in P (M_BRAKE_POSITION=1)
NOMINAL ROTATING MASS OF THE TRAIN	Unknown (M_NOM_ROT_MASS=16)
M_REGENERATIVEBRAKE	00(No interface)
M_EDDYCURRENTBRAKE	00(No interface)
M_MAGNETICSHOEBRAKE	00(No interface)
M_ELECTROPNEUMATICBRAKE	00(No interface)
Q_TRACTIONCUTOFFINTERFACE	1 (Implemented)
Q_SERVICEBRAKEINTERFACE	1 (Implemented)
Q_SERVICEBRAKEFEEDBACK	1 (Implemented)

*Table 12: Braking curves Lambda 1 train data set*

Variable	Value
QUALIFIER FOR GAMMA/LAMBDA DISCRIMINATION	Lambda type: the brake percentage is acquired as Train Data and the conversion model is applicable (Q_BRAKE_CAPT_TYPE=0)
M_BRAKE_PERCENTAGE	100
SPECIAL BRAKES CONFIGURATION NUMBER	1 (no iteration due to N_BRAKE_CONF)
SPECIFIC SPECIAL BRAKES CONFIGURATION FOR LAMBDA TRAINS	M_BRAKE_LAMBDA_CONF(1)=000  (No interface to special brakes exists or all status are inactive)
SERVICE BRAKE DELAY TIME	23,75 s  (T_BRAKE_SERVICE(1)=475)
LOADING GAUGE	G1 (M_LOADINGGAUGE=1)
AXLE LOAD CATEGORY	D2 (M_AXLELOADCAT=7)  (20 t < Axle Load ≤ 22.5 t)
TRACTION SYSTEM VOLTAGE	DC 3 kV (M_VOLTAGE=3)
COUNTRY IDENTIFIER OF THE TRACTION SYSTEM	Spain, conventional lines 220 km/h, 3 kV DC (NID_CTRACTION=15)
AIRTIGHT SYSTEM	FITTED (M_AIRTIGHT=1)
LIST OF NATIONAL SYSTEMS AVAILABLE ON-BOARD	None
AXLE NUMBER	120 (N_AXLE=120)

*Table 12: Braking curves Lambda 1 train data set*

Variable	Value
CORRECTION FACTOR FOR POSITIVE GRADIENTS	$K_{n+(V)} = 2.0$
CORRECTION FACTOR FOR NEGATIVE GRADIENTS	$K_{n-(V)} = 2.0$

### 8.3.4 Braking curves Gamma 2 train data set

**8.3.4.1** This set is meant to test the braking behaviour of the train when:

- a) the Nominal Rotating Mass is set to a value different from “Unknown”,
- b) there is no Traction Cut Off interface,
- c) there is no Service Brake interface,
- d) the Brake Position is set to “Passenger train in P” and
- e) there is no special/additional brakes independent from wheel/rail adhesion.

**8.3.4.2** Note: It should be possible to acquire optionally the brake percentage as train data (see Subset-026 3.13.3.2.2). Input value in such a case: M\_BRAKE\_PERCENTAGE = 100.

*Table 13: Braking curves Gamma 2 train data set*

Variable	Value
MAXIMUM TRAIN SPEED	400 km/h ( $V_{MAXTRAIN}=80$ )
CANT DEFICIENCY TRAIN CATEGORY	Cant Deficiency 225 mm ( $NC_{CDTRAIN}=7$ )
OTHER INTERNATIONAL TRAIN CATEGORY	Passenger train ( $NC_{TRAIN}=4$ )
TRAIN LENGTH	200 m ( $L_{TRAIN}=200$ )
TRACTION CUT-OFF TIME DELAY	0,5 s ( $T_{TRACTION\_CUT\_OFF}=110010b$ )

*Table 13: Braking curves Gamma 2 train data set*

Variable	Value
BRAKE POSITION	Passenger train in P (M_BRAKE_POSITION=0)
NOMINAL ROTATING MASS OF THE TRAIN	15% (M_NOM_ROT_MASS=15)
M_REGENERATIVEBRAKE	00(No interface)
M_EDDYCURRENTBRAKE	00(No interface)
M_MAGNETICSHOEBRAKE	00(No interface)
M_ELECTROPNEUMATICBRAKE	00(No interface)
Q_TRACTIONCUTOFFINTERFACE	0 (Not implemented)
Q_SERVICEBRAKEINTERFACE	0 (Not implemented)
Q_SERVICEBRAKEFEEDBACK	0 (Not implemented)
QUALIFIER FOR GAMMA/LAMBDA DISCRIMINATION	Gamma type: all other captures (Q_BRAKE_CAPT_TYPE=1)
SPECIAL BRAKES CONFIGURATION NUMBER	1 (no iteration due to N_BRAKE_CONF)
SPECIFIC SPECIAL BRAKES CONFIGURATION FOR GAMMA TRAINS	M_BRAKE_GAMMA_CONF(1) = 0000  (No interface to special brakes exists or all status are inactive)
EMERGENCY BRAKE DELAY TIME	2.5 s (T_BRAKE_EMERGENCY(1)=50)
NUMBER OF EMERGENCY BRAKE SECTIONS	2  (N_BRAKE_SECTIONS=2)

*Table 13: Braking curves Gamma 2 train data set*

Variable	Value
EMERGENCY BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_EMERGENCY_COMP(1,1)=0)
EMERGENCY BRAKE DECELERATION COMPONENT (1)	1 m/s <sup>2</sup> (A_BRAKE_EMERGENCY_COMP(1,1)=100)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 50%	0,5 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 0)=10)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 90%	0,6 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 1)=12)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 2)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 3)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 4)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 5)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 6)=16)

*Table 13: Braking curves Gamma 2 train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 7)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 8)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 1), 9)=16)
ROLLING STOCK CORRECTION FACTOR ON WET RAIL	0,8 (M_KWET_RST(A_BRAKE_EMERGENCY_COMP(1, 1))=16)
EMERGENCY BRAKE SPEED COMPONENT (2)	160 km/h (V_BRAKE_EMERGENCY_COMP(1,2)=160)
SERVICE BRAKE DELAY TIME	2,5 s (T_BRAKE_SERVICE(1)=50)
NUMBER OF SERVICE BRAKE SECTIONS	2 (N_BRAKE_SECTIONS(1)=2)
SERVICE BRAKE SPEED COMPONENT (1)	0 km/h (V_BRAKE_SERVICE_COMP(1,1)=0)
SERVICE BRAKE SPEED COMPONENT (2)	100 km/h (V_BRAKE_SERVICE_COMP(1,2)=100)
SERVICE BRAKE DECELERATION COMPONENT (1)	0,8 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(1,1)=80)
SERVICE BRAKE DECELERATION COMPONENT (2)	0,6 m/s <sup>2</sup> (A_BRAKE_SERVICE_COMP(1,2)=60)
EMERGENCY BRAKE DECELERATION COMPONENT (2)	1 m/s <sup>2</sup> (A_BRAKE_EMERGENCY_COMP(1,2)=100)

*Table 13: Braking curves Gamma 2 train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 50%	0,5 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 0)=10)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 90%	0,6 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 1)=12)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 2)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 3)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 4)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 5)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 6)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,99999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 7)=16)
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 8)=16)

*Table 13: Braking curves Gamma 2 train data set*

Variable	Value
ROLLING STOCK CORRECTION FACTOR ON DRY RAIL FOR A CONFIDENCE LEVEL EQUAL TO 99,9999999%	0,8 (M_KDRY_RST(A_BRAKE_EMERGENCY_COMP(1, 2), 9)=16)
ROLLING STOCK CORRECTION FACTOR ON WET RAIL	0,8 (M_KWET_RST(A_BRAKE_EMERGENCY_COMP(1, 2))=16)
LOADING GAUGE	G1 (M_LOADINGGAUGE=1)
AXLE LOAD CATEGORY	D2 (M_AXLELOADCAT=7)  (20 t < Axle Load ≤ 22.5 t)
TRACTION SYSTEM VOLTAGE	AC 25 kV 50 Hz (M_VOLTAGE=1)
COUNTRY IDENTIFIER OF THE TRACTION SYSTEM	Spain, high speed lines, 25 kV AC 50 Hz, 1600/1950 mm (NID_CTRACTION=17)
AIRTIGHT SYSTEM	FITTED (M_AIRTIGHT=1)
LIST OF NATIONAL SYSTEMS AVAILABLE ON-BOARD	None
AXLE NUMBER	32 (N_AXLE=32)

### **8.3.5 Braking curves Lambda 2 train data set**

**8.3.5.1** This set is meant to test the braking behaviour of the train when:

- a) the Service Brake command interface exists, but
- b) the Service brake feedback is not implemented;
- c) T\_TRACTION\_CUT\_OFF=15 s and
- d) the Brake Position is set to “Freight train in G”.

*Table 14: Braking curves Lambda 2 train data set*

Variable	Value
MAXIMUM TRAIN SPEED	200 km/h (V_MAXTRAIN=40)
CANT DEFICIENCY TRAIN CATEGORY	Cant Deficiency 150 mm (NC_CDTRAIN=3)
OTHER INTERNATIONAL TRAIN CATEGORY	Freight train braked in "G" position (NC_TRAIN=2)
TRAIN LENGTH	750 m (L_TRAIN=750)
TRACTION CUT-OFF TIME DELAY	15 s (T_TRACTION_CUT_OFF=10111011100b)
BRAKE POSITION	Freight train in G (M_BRAKE_POSITION=2)
NOMINAL ROTATING MASS OF THE TRAIN	Unknown (M_NOM_ROT_MASS=16)
M_REGENERATIVEBRAKE	00(No interface)
M_EDDYCURRENTBRAKE	00(No interface)
M_MAGNETICSHOEBRAKE	00(No interface)
M_ELECTROPNEUMATICBRAKE	00(No interface)
Q_TRACTIONCUTOFFINTERFACE	1 (Implemented)
Q_SERVICEBRAKEINTERFACE	1 (Implemented)
Q_SERVICEBRAKEFEEDBACK	0 (Not implemented)

*Table 14: Braking curves Lambda 2 train data set*

Variable	Value
QUALIFIER FOR GAMMA/LAMBDA DISCRIMINATION	Lambda type: the brake percentage is acquired as Train Data and the conversion model is applicable (Q_BRAKE_CAPT_TYPE=0)
M_BRAKE_PERCENTAGE	100
SPECIAL BRAKES CONFIGURATION NUMBER	1 (no iteration due to N_BRAKE_CONF)
SPECIFIC SPECIAL BRAKES CONFIGURATION FOR LAMBDA TRAINS	M_BRAKE_LAMBDA_CONF(1)=000  (No interface to special brakes exists or all status are inactive)
SERVICE BRAKE DELAY TIME	23,75 s  (T_BRAKE_SERVICE(1)=475)
LOADING GAUGE	G1 (M_LOADINGGAUGE=1)
AXLE LOAD CATEGORY	D2 (M_AXLELOADCAT=7)  (20 t < Axle Load ≤ 22.5 t)
TRACTION SYSTEM VOLTAGE	DC 3 kV (M_VOLTAGE=3)
COUNTRY IDENTIFIER OF THE TRACTION SYSTEM	Spain, conventional lines 220 km/h, 3 kV DC (NID_CTRACTION=15)
AIRTIGHT SYSTEM	FITTED (M_AIRTIGHT=1)
LIST OF NATIONAL SYSTEMS AVAILABLE ON-BOARD	None
AXLE NUMBER	120 (N_AXLE=120)

### **8.3.6 Braking curves Lambda 3 train data set**

**8.3.6.1** This set includes the parameters for the braking model for a Lambda train where the brake position is “Passenger Train in P”.

*Table 15: Braking curves Lambda 3 train data set*

<b>Variable</b>	<b>Value</b>
MAXIMUM TRAIN SPEED	200km/h (V_MAXTRAIN=40)
CANT DEFICIENCY TRAIN CATEGORY	Cant Deficiency 150mm (NC_CDTRAIN=3)
OTHER INTERNATIONAL TRAIN CATEGORY	Passenger train (NC_TRAIN=4)
TRAIN LENGTH	400m (L_TRAIN=400)
TRACTION CUT-OFF TIME DELAY	0,5s (T_TRACTION_CUT_OFF=110010b)
BRAKE POSITION	Passenger train in P (M_BRAKE_POSITION=0)
NOMINAL ROTATING MASS OF THE TRAIN	Unknown (M_NOM_ROT_MASS=16)
M_REGENERATIVEBRAKE	00(No interface)
M_EDDYCURRENTBRAKE	00(No interface)
M_MAGNETICSHOEBRAKE	00(No interface)
M_ELECTROPNEUMATICBRAKE	00(No interface)
Q_TRACTIONCUTOFFINTERFACE	1 (Implemented)
Q_SERVICEBRAKEINTERFACE	1 (Implemented)

*Table 15: Braking curves Lambda 3 train data set*

Variable	Value
Q_SERVICEBRAKEFEEDBACK	1 (Implemented)
QUALIFIER FOR GAMMA/LAMBDA DISCRIMINATION	Lambda type: the brake percentage is acquired as Train Data and the conversion model is applicable (Q_BRAKE_CAPT_TYPE=0)
M_BRAKE_PERCENTAGE	100
SPECIAL BRAKES CONFIGURATION NUMBER	1 (no iteration due to N_BRAKE_CONF)
SPECIFIC SPECIAL BRAKES CONFIGURATION FOR LAMBDA TRAINS	M_BRAKE_LAMBDA_CONF(1)=000  (No interface to special brakes exists or all status are inactive)
SERVICE BRAKE DELAY TIME	10,6s  (T_BRAKE_SERVICE(1)=212)
LOADING GAUGE	G1 (M_LOADINGGAUGE=1)
AXLE LOAD CATEGORY	D2 (M_AXLELOADCAT=7)  (20 t < Axle Load ≤ 22.5 t)
TRACTION SYSTEM VOLTAGE	DC 3 kV (M_VOLTAGE=3)
COUNTRY IDENTIFIER OF THE TRACTION SYSTEM	Spain, conventional lines 220 km/h, 3kV DC (NID_CTRACTION=15)
AIRTIGHT SYSTEM	FITTED (M_AIRTIGHT=1)

*Table 15: Braking curves Lambda 3 train data set*

Variable	Value
LIST OF NATIONAL SYSTEMS AVAILABLE ON-BOARD	None
AXLE NUMBER	64 (N_AXLE=64)

## **8.4 Modification of the default values of the train data**

- 8.4.1.1** The on-board equipment shall support all the possible values of the train data as expressed in chapter 7 of Subset-026 [2].

## **8.5 Reception of train data from external sources**

- 8.5.1.1** The on-board equipment shall be configured to accept train data input from an external source (see 5.17 in Subset-026 [2]).

- 8.5.1.1.1 The on-board equipment shall be configured to require a validation by the driver for some of the train data, but not for all of them.

- 8.5.1.1.2 The set of train data that do not require a validation by the driver shall contain at least one train data among the train category, the axle load category, the traction system(s) accepted by the engine and the loading gauge and one train data not belonging to these ones.

- 8.5.1.2** The on-board equipment supplier shall provide the necessary information to allow the train data input from the reference test facility to the on-board equipment as described in the document [7].

## **8.6 Reception of train data from the driver**

- 8.6.1.1** The on-board equipment shall be configured to allow the modification of the following train data by the driver:

- a) Train category(ies);
- b) Train length;
- c) Traction / brake parameters;
- d) Maximum train speed;
- e) Loading gauge;
- f) Axle load category;

g) Train fitted with airtight system.

## **8.7 Offset between the front of the train and the balise antenna**

**8.7.1.1** One balise antenna shall be configured. The offset between the position of the balise antenna and the front end of the train corresponding to the first cab open in the sequence shall be set to 5 m.

## **8.8 Default list of levels configured on-board**

**8.8.1.1** The default list of levels configured on-board shall contain L0, L1, L2, L3 and LNTC.

**8.8.1.2** The table of priorities of trackside supported levels shall allow to be configured according to the levels requested in the test sequences.

## **8.9 DMI configuration**

### **8.9.1 Languages**

**8.9.1.1** The on-board equipment shall be configured to support at least two languages used to display information to the driver (see 3.12.3.3.1 in Subset-026 [2]).

### **8.9.2 Speed dial**

**8.9.2.1** The on-board equipment shall be configured to display a range of the speed dial from 0 km/h to 400 km/h.

### **8.9.3 Change of train orientation**

**8.9.3.1** The on-board equipment supplier shall provide a mean to simulate the scenario in which the driver closes a desk A and leaves a cab A of the leading engine of the train, to go to cab B and open desk B of this same engine. Concerning the DMI, this may be achieved through one or two DMI.

## **8.10 Track conditions**

### **8.10.1 Necessary actions**

**8.10.1.1** There are some necessary actions to be performed related to several track conditions:

- a) Powerless section (see 5.18.2.2.2, 5.18.2.5.1, 5.18.3.2.2 and 5.18.3.4.1 in Subset-026 [2])
- b) Air tightness area (see 5.18.6.2.2 and 5.18.6.4.1 in Subset-026 [2])
- c) Inhibition of a defined type of brake (see 5.18.7.3.1 in Subset-026 [2])
- d) Change the traction system (see 5.18.10.4 in Subset-026 [2])

**8.10.1.2** These actions shall be performed automatically or by the driver.

**8.10.1.3** The on-board equipment supplier shall provide a list defining for each action if the action is performed automatically by the on-board equipment or not.

## **8.10.2 Time to perform actions**

**8.10.2.1** This section defines the values of the time necessary to perform some actions related to the track conditions:

- a) Lower the pantograph (see 5.18.2.2.1 in Subset-026 [2]): 5s
- b) Switch off the main power switch (see 5.18.3.2.1 in Subset-026 [2]): 5s
- c) Close the air conditioning intake (see 5.18.6.2.1 in Subset-026 [2]): 5s
- d) Inhibition of a defined type of brake (see 5.18.7.3.2 in Subset-026 [2]): 5s
- e) Change the traction system (see 5.18.10.3 in Subset-026 [2]): 5s

**8.10.2.2** The on-board equipment shall comply with these values.

## **8.11 Corrections factors for gradient**

**8.11.1.1** The on-board equipment shall be configured to support the following corrections factors for gradient on the normal service brake (see 3.13.2.2.9.2 in Subset-026 [2]).

## **8.12 On-board ETCS identity**

**8.12.1.1** The on-board equipment ETCS identifier shall be set to NID\_ENGINE=76000d (see 7.5.1.88 in Subset-026 [2]).

## **8.13 Radios**

**8.13.1.1** The on-board equipment shall be equipped with two radios to support the handling of two communication sessions at the same time.

**8.13.1.1.1** The radio subscriber number shall be set to NID\_RADIO=1111FFFFFFFFFFFF for the first radio and NID\_RADIO=1112FFFFFFFFFFFF for the second radio (see 7.5.1.95 in Subset-026 [2]).

**8.13.1.2** The on-board equipment shall be able to deactivate the second radio.

## **8.14 Big metal masses**

**8.14.1.1** An on-board integrity check alarm reporting a malfunction for the on-board balise transmission function may be triggered by a big metal mass.

**8.14.1.2** The on-board equipment supplier shall provide the necessary information to detect such alarms and the possible associated safety reactions.

## **8.15 Switch to SF and IS modes**

- 8.15.1.1** The on-board equipment supplier shall provide the necessary information to perform the switch to SF and IS modes.

## **Annex A      DEFAULT START OF MISSIONS**

### **A.1      Definition of the default SoM to use in L0**

*Table 16: Default SoM to use in L0*

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
<b>Feature 4060300:</b> 4.6.3: Transitions Conditions Table <b>Test Case 10:</b> The ETCS on-board equipment is powered .Transition Condition Id [4].											
1	1	0.00	N/A	NP	ERTMS/ETCS on-board unit is powered up	I	INT	The on-board equipment changes to SB mode.	N/A	NP	-
2	2	0.00	N/A	NP	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=6) is recorded	O	JRU	-	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 24:</b> Start of Mission procedure is engaged											
3	1	0.00	N/A	SB	Driver opens desk	I	TIU	-	N/A	SB	-
4	2	0.00	N/A	SB	The 'CAB STATUS' message is RECORDED with the variable M_CAB_A_STATUS=1 (Active).	O	JRU	-	N/A	SB	-
5	3	0.00	N/A	SB	The actual mode SB is DISPLAYED	O	DMI	The SB indication after opening the desk may not be recorded. Because the change of mode was already recorded while desk was closed	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 7:</b> The on-board equipment requests the driver to enter a driver ID within the scope of the Start of Mission procedure in SB mode when the status of the driver ID is unknown.											
6	1	0.00	N/A	SB	The on-board equipment requires the driver to enter a Driver ID There is NO initial Driver ID value displayed	O	DMI	Starting conditions : There is no value initially displayed since the status of the driver ID is unknown.	N/A	SB	-
7	2	0.00	N/A	SB	The on-board equipment prevents the driver from continuing the procedure before the validation of the Driver ID is done.	O	DMI	-	N/A	SB	-
8	3	0.00	N/A	SB	The driver enters and validates a correct Driver ID	I	DMI	-	N/A	SB	-
9	4	0.00	N/A	SB	The validated Driver ID is recorded on the JRU with the DRIVER_ID variable in a 'GENERAL MESSAGE'.	O	JRU	A 'GENERAL MESSAGE' is recorded every 5s by the on-board equipment.	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 10:</b> Within the scope of the Start of Mission procedure in SB mode, the status of the ERTMS/ETCS Level data is INVALID. The driver selects a level (the existing ERTMS/ETCS Level or a new one).											
10	1	0.00	N/A	SB	The driver selects "Level <L0/LNTC/L1/L2/L3>"	I	DMI	Depending on the implementation, a list of available levels may be presented to the driver on the DMI. The driver is then allowed to select one level among the proposed levels. For NTC levels, the abbreviations of the concerned National Systems shall be presented to the driver.  The Driver selects L0	L0	SB	-
11	2	0.00	L0	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVERACTIONS=<34/35/36/37/38>) is recorded	O	JRU	-	L0	SB	-
12	3	0.00	L0	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_LEVEL=<0/1/2/3/4>) is recorded	O	JRU	-	L0	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 6:</b> Within the scope of the Start of Mission procedure in SB mode, the On-Board equipment offers the driver to select either SH or NL or 'Train Data Entry' before the on-board equipment requests the driver to enter a complete set of Train Data. The driver selects 'Train Data Entry'.											
13	1	0.00	L0	SB	The driver can select either SH or NL or 'Train Data Entry'	O	DMI	Starting conditions The 'Non-Leading' button is enabled if the 'non leading' input signal is received.	L0	SB	-
14	2	0.00	L0	SB	The driver selects 'Train Data Entry'	I	DMI	-	L0	SB	-
15	3	0.00	L0	SB	A Train data window is displayed on the DMI.	O	DMI	-	L0	SB	-
16	4	0.00	L0	SB	The driver's selection is recorded on the JRU.	O	JRU	-	L0	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 47:</b> The on-board equipment requests the driver to enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when the status of the Train Data is unknown (S12)											

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
18	1	0.00	L0	SB	The on-board equipment requires the driver to enter all Train Data unknown by the on-board equipment and prevents the driver from performing any other actions.	O	DMI	The driver might be requested to enter the 'Train category(ies)', 'Train length', 'Traction / brake parameters', 'Maximum train speed', 'Loading gauge', 'Axle load category', 'Train fitted with airtight system', but the driver shall never be requested to enter the 'Traction system(s) accepted by the engine', 'List of National Systems available on-board' or 'Axle number'.	L0	SB	-
19	2	0.00	L0	SB	The driver enters each Train data unknown on-board	I	DMI	-	L0	SB	-
20	3	0.00	L0	SB	The driver is allowed to validate the train data	O	DMI	A complete set of valid Train Data is available	L0	SB	-
21	4	0.00	L0	SB	The driver validates the train data.	I	DMI	The on-board equipment allows the driver to validate as soon as a valid and complete set of Train Data is entered.	L0	SB	-
22	5	0.00	L0	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11) is recorded	O	JRU	Triggered by : The driver validation.	L0	SB	-
23	6	0.00	L0	SB	TRAIN DATA (NID_MESSAGE_JRU=2) is recorded	O	JRU	Triggered by : Data Entry completed	L0	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 46:</b> After the set of Train Data has been entered/re-validated by the driver (in S12), if the status of the Train running number is 'unknown', the ERTMS/ETCS on-board equipment requests the driver to enter the Train running number (S13)											
25	1	0.00	L0	SB	The driver is requested to enter the Train running number.	O	DMI	-	L0	SB	-
26	2	0.00	L0	SB	The driver enters the "Train Running Number" [MAIN]	I	DMI	Entered Train Running Number: NID_OPERATIONAL_1	L0	SB	-
27	3	0.00	L0	SB	ADDITIONAL DATA (NID_MESSAGE_JRU=24; NID_OPERATIONAL=NID_OPERATIONAL_1) is recorded	O	JRU	-	L0	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 1:</b> The on-board equipment requests the driver to re-validate/enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when level is 0/1/NTC (Subset-026-5.4.3.2 S12). The driver is requested to enter/re-validate the Train running number if the status of the Train running number is 'unknown' or 'invalid'.											
28	3	0.00	L0	SB	The DMI allows the driver to select the option 'START'.	O	DMI	-	L0	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 27:</b> The driver requires 'Start' within the scope of the Start of Mission procedure in SB mode and in ERTMS Level 0.											
29	1	0.00	L0	SB	The driver selects 'Start'.	I	DMI	-	L0	SB	-
30	2	0.00	L0	SB	Driver's selection of 'Start' is recorded on the JRU.	O	JRU	Triggered by: The driver acts on the on-board MMI.	L0	SB	-
31	3	0.00	L0	SB	An acknowledgement request for running in Unfitted mode is displayed on the DMI	O	DMI	The on-board equipment will then waits for the driver to acknowledge the acknowledgement request for running in Unfitted mode	L0	SB	-
32	4	0.00	L0	SB	Acknowledgement request for running in Unfitted mode is recorded on the JRU	O	JRU	-	L0	SB	-
<b>Feature 4060300:</b> 4.6.3: Transitions Conditions Table <b>Test Case 58:</b> After having selected the start, an acknowledgement request for UN mode is displayed to the driver. The driver acknowledges UN mode. Mode is changed to Unfitted. Transition Condition Id [60].											
35	3	0.00	L0	SB	The driver acknowledges 'Unfitted'	I	DMI	-	L0	SB	-
36	4	0.00	L0	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVER_ACTIONS=0000 0100 ) is recorded	O	JRU	-	L0	SB	-
37	5	0.00	L0	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=4) is recorded	O	JRU	-	L0	UN	-
38	6	0.00	L0	UN	The Mode symbol 'Unfitted' is displayed	O	DMI	DMI Object : Symbol MO16	L0	UN	-

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
39	7	0.00	L0	UN	DMI SYMBOL STATUS (NID_MESSAGE_JRU=21; DMI_SYMB_STATUS=<Bit31=1>) is recorded	O	JRU	-	L0	UN	-

*Table 17: DMI Events for Step 10 at default SoM to use in L0*

Step 10: DMI Events Distance 0.00 m		
Event Id.	Event Name	Data
29	Request Change Level	LEVEL=0

## A.2 Definition of the default SoM to use in L1

*Table 18: Default SoM to use in L1*

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
<b>Feature 4060300:</b> 4.6.3: Transitions Conditions Table <b>Test Case 10:</b> The ETCS on-board equipment is powered. Transition Condition Id [4].											
1	1	0.00	N/A	NP	ERTMS/ETCS on-board unit is powered up	I	INT	The on-board equipment changes to SB mode.	N/A	NP	-
2	2	0.00	N/A	NP	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=6) is recorded	O	JRU	-	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 24:</b> Start of Mission procedure is engaged											
3	1	0.00	N/A	SB	Driver opens desk	I	TIU	-	N/A	SB	-
4	2	0.00	N/A	SB	The 'CAB STATUS' message is RECORDED with the variable M_CAB_A_STATUS=1 (Active).	O	JRU	-	N/A	SB	-
5	3	0.00	N/A	SB	The actual mode SB is DISPLAYED	O	DMI	The SB indication after opening the desk may not be recorded. Because the change of mode was already recorded while desk was closed	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 7:</b> The on-board equipment requests the driver to enter a driver ID within the scope of the Start of Mission procedure in SB mode when the status of the driver ID is unknown.											
6	1	0.00	N/A	SB	The on-board equipment requires the driver to enter a Driver ID There is NO initial Driver ID value displayed	O	DMI	Starting conditions : There is no value initially displayed since the status of the driver ID is unknown.	N/A	SB	-
7	2	0.00	N/A	SB	The on-board equipment prevents the driver from continuing the procedure before the validation of the Driver ID is done.	O	DMI	-	N/A	SB	-
8	3	0.00	N/A	SB	The driver enters and validates a correct Driver ID	I	DMI	-	N/A	SB	-
9	4	0.00	N/A	SB	The validated Driver ID is recorded on the JRU with the DRIVER_ID variable in a 'GENERAL MESSAGE'.	O	JRU	A 'GENERAL MESSAGE' is recorded every 5s by the on-board equipment.	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 10:</b> Within the scope of the Start of Mission procedure in SB mode, the status of the ERTMS/ETCS Level data is INVALID. The driver selects a level (the existing ERTMS/ETCS Level or a new one).											
10	1	0.00	N/A	SB	The driver selects "Level <L0/LNTC/L1/L2/L3>"	I	DMI	Depending on the implementation, a list of available levels may be presented to the driver on the DMI. The driver is then allowed to select one level among the proposed levels. For NTC levels, the abbreviations of the concerned National Systems shall be presented to the driver.  The Driver selects L1	L1	SB	-
11	2	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVER_ACTIONS=<34/35/36/37/38>) is recorded	O	JRU	-	L1	SB	-
12	3	0.00	L1	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_LEVEL=<0/1/2/3/4>) is recorded	O	JRU	-	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 6:</b> Within the scope of the Start of Mission procedure in SB mode, the On-Board equipment offers the driver to select either SH or NL or 'Train Data Entry' before the on-board equipment requests the driver to enter a complete set of Train Data. The driver selects 'Train Data Entry'.											
13	1	0.00	L1	SB	The driver can select either SH or NL or 'Train Data Entry'	O	DMI	Starting conditions The 'Non-Leading' button is enabled if the 'non leading' input signal is received.	L1	SB	-
14	2	0.00	L1	SB	The driver selects 'Train Data Entry'	I	DMI	-	L1	SB	-
15	3	0.00	L1	SB	A Train data window is displayed on the DMI.	O	DMI	-	L1	SB	-
16	4	0.00	L1	SB	The driver's selection is recorded on the JRU.	O	JRU	-	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 47:</b> The on-board equipment requests the driver to enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when the status of the Train Data is unknown (S12)											

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
18	1	0.00	L1	SB	The on-board equipment requires the driver to enter all Train Data unknown by the on-board equipment and prevents the driver from performing any other actions.	O	DMI	The driver might be requested to enter the 'Train category(ies)', 'Train length', 'Traction / brake parameters', 'Maximum train speed', 'Loading gauge', 'Axle load category', 'Train fitted with airtight system', but the driver shall never be requested to enter the 'Traction system(s) accepted by the engine', 'List of National Systems available on-board' or 'Axle number'.	L1	SB	-
19	2	0.00	L1	SB	The driver enters each Train data unknown on-board	I	DMI	-	L1	SB	-
20	3	0.00	L1	SB	The driver is allowed to validate the train data	O	DMI	A complete set of valid Train Data is available	L1	SB	-
21	4	0.00	L1	SB	The driver validates the train data.	I	DMI	The on-board equipment allows the driver to validate as soon as a valid and complete set of Train Data is entered.	L1	SB	-
22	5	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11) is recorded	O	JRU	Triggered by : The driver validation.	L1	SB	-
23	6	0.00	L1	SB	TRAIN DATA (NID_MESSAGE_JRU=2) is recorded	O	JRU	Triggered by : Data Entry completed	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 46:</b> After the set of Train Data has been entered/re-validated by the driver (in S12), if the status of the Train running number is 'unknown', the ERTMS/ETCS on-board equipment requests the driver to enter the Train running number (S13)											
25	1	0.00	L1	SB	The driver is requested to enter the Train running number.	O	DMI	-	L1	SB	-
26	2	0.00	L1	SB	The driver enters the "Train Running Number" [MAIN]	I	DMI	Entered Train Running Number: NID_OPERATIONAL_1	L1	SB	-
27	3	0.00	L1	SB	ADDITIONAL DATA (NID_MESSAGE_JRU=24; NID_OPERATIONAL=NID_OPERATIONAL_1) is recorded	O	JRU	-	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 1:</b> The on-board equipment requests the driver to re-validate/enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when level is 0/1/NTC (Subset-026-5.4.3.2 S12). The driver is requested to enter/re-validate the Train running number if the status of the Train running number is 'unknown' or 'invalid'.											
28	3	0.00	L1	SB	The DMI allows the driver to select the option 'START'.	O	DMI	-	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 16:</b> The driver selects 'Start' within the scope of the Start of Mission procedure in SB mode and in ERTMS Level 1.											
29	1	0.00	L1	SB	The driver selects 'Start'.	I	DMI	-	L1	SB	-
30	2	0.00	L1	SB	Driver's selection of 'Start' is recorded on the JRU	O	JRU	Triggered by: The driver acts on the on-board DMI.	L1	SB	-
31	3	0.00	L1	SB	An acknowledgement request for running in Staff Responsible mode is displayed on the DMI	O	DMI	The on-board equipment will then waits for the driver to acknowledge the acknowledgement request for running in Staff Responsible mode	L1	SB	-
32	4	0.00	L1	SB	The acknowledgement request for running in Staff Responsible mode is recorded	O	JRU	-	L1	SB	-
33	5	0.00	L1	SB	The driver acknowledges 'Staff Responsible'	I	DMI	Symbol MO10	L1	SB	-
34	6	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVER_ACTIONS= 0000 0011) is recorded	O	JRU	-	L1	SB	-
35	7	0.00	L1	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=2) is recorded	O	JRU	-	L1	SR	-
36	8	0.00	L1	SR	The Mode symbol 'Staff Responsible' is displayed	O	DMI	-	L1	SR	-
37	9	0.00	L1	SR	DMI SYMBOL STATUS (NID_MESSAGE_JRU=21; DMI_SYMB_STATUS=<Bit24=1>) is recorded	O	JRU	-	L1	SR	-

*Table 19: DMI Events for Step 10 at default SoM to use in L1*

Step 10: DMI Events Distance 0.00 m		
Event Id.	Event Name	Data
29	Request Change Level	LEVEL=0

### A.3 Definition of the default process to reach L2

*Table 20: Default process to use to reach L2*

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
Feature 4060300: 4.6.3: Transitions Conditions Table Test Case 10: The ETCS on-board equipment is powered .Transition Condition Id [4].											
1	1	0.00	N/A	NP	ERTMS/ETCS on-board unit is powered up	I	INT	The on-board equipment changes to SB mode.	N/A	NP	-
2	2	0.00	N/A	NP	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=6) is recorded	O	JRU	-	N/A	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure Test Case 24: Start of Mission procedure is engaged											
3	1	0.00	N/A	SB	Driver opens desk	I	TIU	-	N/A	SB	-
4	2	0.00	N/A	SB	The 'CAB STATUS' message is RECORDED with the variable M_CAB_A_STATUS=1 (Active).	O	JRU	-	N/A	SB	-
5	3	0.00	N/A	SB	The actual mode SB is DISPLAYED	O	DMI	The SB indication after opening the desk may not be recorded. Because the change of mode was already recorded while desk was closed	N/A	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure Test Case 7: The on-board equipment requests the driver to enter a driver ID within the scope of the Start of Mission procedure in SB mode when the status of the driver ID is unknown.											
6	1	0.00	N/A	SB	The on-board equipment requires the driver to enter a Driver ID There is NO initial Driver ID value displayed	O	DMI	Starting conditions : There is no value initially displayed since the status of the driver ID is unknown.	N/A	SB	-
7	2	0.00	N/A	SB	The on-board equipment prevents the driver from continuing the procedure before the validation of the Driver ID is done.	O	DMI	-	N/A	SB	-
8	3	0.00	N/A	SB	The driver enters and validates a correct Driver ID	I	DMI	-	N/A	SB	-
9	4	0.00	N/A	SB	The validated Driver ID is recorded on the JRU with the DRIVER_ID variable in a 'GENERAL MESSAGE'.	O	JRU	A 'GENERAL MESSAGE' is recorded every 5s by the on-board equipment.	N/A	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure Test Case 10: Within the scope of the Start of Mission procedure in SB mode, the status of the ERTMS/ETCS Level data is INVALID. The driver selects a level (the existing ERTMS/ETCS Level or a new one).											
10	1	0.00	N/A	SB	The driver selects "Level <L0/LNTC/L1/L2/L3>"	I	DMI	Depending on the implementation, a list of available levels may be presented to the driver on the DMI. The driver is then allowed to select one level among the proposed levels. For NTC levels, the abbreviations of the concerned National Systems shall be presented to the driver.  The Driver selects L1	L1	SB	-
11	2	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVERACTIONS=<34/35/36/37/38>) is recorded	O	JRU	-	L1	SB	-
12	3	0.00	L1	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_LEVEL=<0/1/2/3/4>) is recorded	O	JRU	-	L1	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure Test Case 6: Within the scope of the Start of Mission procedure in SB mode, the On-Board equipment offers the driver to select either SH or NL or 'Train Data Entry' before the on-board equipment requests the driver to enter a complete set of Train Data. The driver selects 'Train Data Entry'.											
13	1	0.00	L1	SB	The driver can select either SH or NL or 'Train Data Entry'	O	DMI	Starting conditions The 'Non-Leading' button is enabled if the 'non leading' input signal is received.	L1	SB	-
14	2	0.00	L1	SB	The driver selects 'Train Data Entry'	I	DMI	-	L1	SB	-
15	3	0.00	L1	SB	A Train data window is displayed on the DMI.	O	DMI	-	L1	SB	-
16	4	0.00	L1	SB	The driver's selection is recorded on the JRU.	O	JRU	-	L1	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure Test Case 47: The on-board equipment requests the driver to enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when the status of the Train Data is unknown (S12)											

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
18	1	0.00	L1	SB	The on-board equipment requires the driver to enter all Train Data unknown by the on-board equipment and prevents the driver from performing any other actions.	O	DMI	The driver might be requested to enter the 'Train category(ies)', 'Train length', 'Traction / brake parameters', 'Maximum train speed', 'Loading gauge', 'Axle load category', 'Train fitted with airtight system', but the driver shall never be requested to enter the 'Traction system(s) accepted by the engine', 'List of National Systems available on-board' or 'Axle number'.	L1	SB	-
19	2	0.00	L1	SB	The driver enters each Train data unknown on-board	I	DMI	-	L1	SB	-
20	3	0.00	L1	SB	The driver is allowed to validate the train data	O	DMI	A complete set of valid Train Data is available	L1	SB	-
21	4	0.00	L1	SB	The driver validates the train data.	I	DMI	The on-board equipment allows the driver to validate as soon as a valid and complete set of Train Data is entered.	L1	SB	-
22	5	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11) is recorded	O	JRU	Triggered by : The driver validation.	L1	SB	-
23	6	0.00	L1	SB	TRAIN DATA (NID_MESSAGE_JRU=2) is recorded	O	JRU	Triggered by : Data Entry completed	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 46:</b> After the set of Train Data has been entered/re-validated by the driver (in S12), if the status of the Train running number is 'unknown', the ERTMS/ETCS on-board equipment requests the driver to enter the Train running number (S13)											
25	1	0.00	L1	SB	The driver is requested to enter the Train running number.	O	DMI	-	L1	SB	-
26	2	0.00	L1	SB	The driver enters the "Train Running Number" [MAIN]	I	DMI	Entered Train Running Number: NID_OPERATIONAL_1	L1	SB	-
27	3	0.00	L1	SB	ADDITIONAL DATA (NID_MESSAGE_JRU=24; NID_OPERATIONAL=NID_OPERATIONAL_1) is recorded	O	JRU	-	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 1:</b> The on-board equipment requests the driver to re-validate/enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when level is 0/1/NTC (Subset-026-5.4.3.2 S12). The driver is requested to enter/re-validate the Train running number if the status of the Train running number is 'unknown' or 'invalid'.											
28	3	0.00	L1	SB	The DMI allows the driver to select the option 'START'.	O	DMI	-	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 16:</b> The driver selects 'Start' within the scope of the Start of Mission procedure in SB mode and in ERTMS Level 1.											
29	1	0.00	L1	SB	The driver selects 'Start'.	I	DMI	-	L1	SB	-
30	2	0.00	L1	SB	Driver's selection of 'Start' is recorded on the JRU	O	JRU	Triggered by: The driver acts on the on-board DMI.	L1	SB	-
31	3	0.00	L1	SB	An acknowledgement request for running in Staff Responsible mode is displayed on the DMI	O	DMI	The on-board equipment will then waits for the driver to acknowledge the acknowledgement request for running in Staff Responsible mode	L1	SB	-
32	4	0.00	L1	SB	The acknowledgement request for running in Staff Responsible mode is recorded	O	JRU	-	L1	SB	-
33	5	0.00	L1	SB	The driver acknowledges 'Staff Responsible'	I	DMI	Symbol MO10	L1	SB	-
34	6	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVER_ACTIONS= 0000 0011) is recorded	O	JRU	-	L1	SB	-
35	7	0.00	L1	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=2) is recorded	O	JRU	-	L1	SR	-
36	8	0.00	L1	SR	The Mode symbol 'Staff Responsible' is displayed	O	DMI	-	L1	SR	-
37	9	0.00	L1	SR	DMI SYMBOL STATUS (NID_MESSAGE_JRU=21; DMI_SYMB_STATUS=<Bit24=1>) is recorded	O	JRU	-	L1	SR	-

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
<b>Feature 5100100:</b> 5.10.1: Level Transitions General requirements <b>Test Case 37:</b> The train receives an order to switch immediately from L1 to L2 at the current position. On-board equipment immediately switches to L2.											
39	1	50.00	L1	SR	The train reaches the Level transition border and an order to switch immediately to Level 2 is received from balise group BGa. Packet 41: 'Level Transition Order' is RECEIVED. D_LEVELTR= 0 or = 32767 M_LEVELTR=3	I	BTM	-	L1	SR	-
<b>Feature 3050300:</b> 3.5.3: Establishing a communication session <b>Test Case 22:</b> System version is compatible and session is established.											
41	1	50.00	L1	SR	One Balise Group message (NID_RBC?16383) containing packet 42 (NID_RADIO ? FFFF FFFF FFFF FFFF) is received	I	BTM	Not use last known RBC and don't use short number.	L1	SR	-
42	2	50.00	L1	SR	TELEGRAM FROM BALISE (NID_MESSAGE_JRU=6) is recorded	O	JRU	-	L1	SR	-
<b>Feature 5100100:</b> 5.10.1: Level Transitions General requirements <b>Test Case 37:</b> The train receives an order to switch immediately from L1 to L2 at the current position. On-board equipment immediately switches to L2.											
43	3	50.00	L1	SR	Level 2 is DISPLAYED.	O	DMI	(Except in SL mode) The On-board equipment switches to Level 2.	L2	SR	-
44	4	50.00	L2	SR	New Level 2 is RECORDED.	O	JRU	-	L2	SR	-
<b>Feature 3050300:</b> 3.5.3: Establishing a communication session <b>Test Case 22:</b> System version is compatible and session is established.											
45	3	50.00	L2	SR	SA-CONNECT.Request is transmitted	O	RTM	According to EURORADIO specifications. This attempt shall be repeated until successful.  The onboard tries to set up a connection with the phone number included in the session management packet.	L2	SR	-
46	4	50.00	L2	SR	SA-CONNECT.Confirm is received	I	RTM	-	L2	SR	-
47	5	50.00	L2	SR	The Status symbol "Safe radio connection - Connection Up" is displayed	O	DMI	-	L2	SR	-
48	6	50.00	L2	SR	JRU step 'DMI SYMBOL STATUS (NID_MESSAGE_JRU=21; DMI_SYMB_STATUS=<Bit40=1>) is recorded'.	O	JRU	-	L2	SR	-
49	7	50.00	L2	SR	SA-DATA.Request with Euroradio Message "Initiation of a communication session" (NID_MESSAGE=155) is transmitted	O	RTM	-	L2	SR	-
50	8	50.00	L2	SR	MESSAGE TO RBC (NID_MESSAGE_JRU=10) is recorded	O	JRU	-	L2	SR	-
51	9	50.00	L2	SR	SA-DATA.Indication with Euroradio Message "RBC/RIU System Version" (NID_MESSAGE=32) is received	I	RTM	System versions M_VERSION (Version of the ERTMS/ETCS language) are compatible, so that the communication session established for on-board	L2	SR	-
52	10	50.00	L2	SR	MESSAGE FROM RBC (NID_MESSAGE_JRU=9) is recorded	O	JRU	-	L2	SR	-
53	11	50.00	L2	SR	SA-DATA.Request with Euroradio Message "Session Established" (NID_MESSAGE=159) is transmitted	O	RTM	-	L2	SR	-
54	12	50.00	L2	SR	MESSAGE TO RBC (NID_MESSAGE_JRU=10) is recorded	O	JRU	-	L2	SR	-
<b>Feature 4080401:</b> 4.8.4: Accepted Information depending on the modes - Acknowledgement of train data <b>Test Case 1:</b> Radio message with new Train Data and acknowledge of the RBC											
56	1	50.00	L2	SR	SA-DATA.Request with Euroradio Message "Validated Train Data" (NID_MESSAGE=129) is transmitted	O	RTM	Validated train data	L2	SR	-
57	2	50.00	L2	SR	MESSAGE TO RBC (NID_MESSAGE_JRU=10; NID_MESSAGE=129) is recorded	O	JRU	-	L2	SR	-

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
58	3	50.00	L2	SR	SA-DATA.Indication with Euroradio Message "Acknowledgement of Train Data" (NID_MESSAGE=8) is received	I	RTM	-	L2	SR	-
59	4	50.00	L2	SR	MESSAGE FROM RBC (NID_MESSAGE_JRU=9; NID_MESSAGE=8) is recorded	O	JRU	-	L2	SR	-

**Table 21: DMI Events for Step 10 at default process to reach L2**

Step 10: DMI Events Distance 0.00 m		
Event Id.	Event Name	Data
29	Request Change Level	LEVEL=0

**Table 22: Balise Group content for Step 39 at default process to reach L2**

Step 39 : Balise Group BG 1 d 1/2 Distance 50.00 m				
Variable	Length	Value	Comment	User comment
Q_UPDOWN	1	1 b		
M_VERSION	7	0100000 b		
Q_MEDIA	1	0 b		
N_PIG	3	0 d		
N_TOTAL	3	1 d		
M_DUP	2	00 b		
M_MCOUNT	8	0 d		
NID_C	10	352 d		
NID_BG	14	1 d		
Q_LINK	1	1 b		
NID_PACKET	8	41 d	Level transition order	
Q_DIR	2	01 b		
L_PACKET	13	63 d		
Q_SCALE	2	01 b		
D_LEVELTR	15	0 d		
M_LEVELTR	3	3 d		
L_ACKLEVELTR	15	0 d		
N_ITER	5	0 d		
NID_PACKET	8	42 d	Session management	
Q_DIR	2	01 b		
L_PACKET	13	113 d		
Q_RBC	1	1 b		
NID_C	10	352 d		
NID_RBC	14	1515 d		
NID_RADIO	64	003265342101FFFF h		
Q_SLEEPSESSION	1	0 b		
NID_PACKET	8	255 d	End of information	

**Table 23: Balise Group content for Step 39 at default process to reach L2**

Step 39 : Balise Group BG 1 d 2/2 Distance 55.00 m				
Variable	Length	Value	Comment	User comment
Q_UPDOWN	1	1 b		
M_VERSION	7	0100000 b		
Q_MEDIA	1	0 b		
N_PIG	3	1 d		
N_TOTAL	3	1 d		
M_DUP	2	00 b		
M_MCOUNT	8	0 d		
NID_C	10	352 d		
NID_BG	14	1 d		
Q_LINK	1	1 b		
NID_PACKET	8	255 d	End of information	

**Table 24: Balise Group content for Step 49 at default process to reach L2**

Step 49 : Message 155 - Initiation of a Communication Session (RBC n? 1) Distance 50.00 m				
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	155 d		

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

Step 49 : Message 155 - Initiation of a Communication Session (RBC n? 1)				
Distance 50.00 m				
Variable	Length	Value	Comment	User comment
L_MESSAGE	10	10 d		
T_TRAIN	32	0 d		
NID_ENGINE	24	76000 d		

*Table 25: Balise Group content for Step 51 at default process to reach L2*

Step 51 : Message 32 - RBC/RIU System Version (RBC n? 1)				
Distance 50.00 m Delay : 5.00 s Conditional Message Id : 155 Back Delay : 5.00 s				
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	32 d		
L_MESSAGE	10	11 d		
T_TRAIN	32	0 d		
M_ACK	1	0 b		
NID_LRBG	24	16777215 d		
M_VERSION	7	0100000 b		

*Table 26: Balise Group content for Step 53 at default process to reach L2*

Step 53 : Message 159 - Session Established (RBC n? 1)				
Distance 50.00 m				
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	159 d		
L_MESSAGE	10	29 d		
T_TRAIN	32	0 d		
NID_ENGINE	24	76000 d		
NID_PACKET	8	3 d	Onboard telephone numbers	
L_PACKET	13	154 d		
N_ITER	5	2 d		
NID_RADIO	64	1111FFFFFFFFFFFF h		
NID_RADIO	64	1112FFFFFFFFFFFF h		

*Table 27: Balise Group content for Step 56 at default process to reach L2*

Step 56 : Message 129 - Validated Train Data (RBC n? 1)				
Distance 50.00 m				
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	129 d		
L_MESSAGE	10	40 d		
T_TRAIN	32	0 d		
NID_ENGINE	24	76000 d		
NID_PACKET	8	0 d	Position report	
L_PACKET	13	114 d		
Q_SCALE	2	01 b		
NID_LRBG	24	5767169 d		
D_LRBG	15	150 d		
Q_DIRLRBG	2	01 b		
Q_DLRBG	2	01 b		
L_DOUBTOVER	15	0 d		
L_DOUBTUNDER	15	0 d		
Q_LENGTH	2	00 b		
V_TRAIN	7	7 d		

Step 56 : Message 129 - Validated Train Data (RBC n? 1)				
Distance	50.00 m			
Variable	Length	Value	Comment	User comment
Q_DIRTRAIN	2	01 b		
M_MODE	4	0010 b		
M_LEVEL	3	3 d		
NID_PACKET	8	11 d	Validated train data	
L_PACKET	13	126 d		
NC_CDTRAIN	4	7 d		
NC_TRAIN	15	4 d		
L_TRAIN	12	40 d		
V_MAXTRAIN	7	80 d		
M_LOADINGGAUGE	8	00000001 b		
M_AXLELOADCAT	7	7 d		
M_AIRTIGHT	2	01 b		
N_AXLE	10	4 d		
N_ITER	5	1 d		
M_VOLTAGE	4	3 d		
NID_CTRACTION	10	15 d		
N_ITER	5	2 d		
NID_NTC	8	2 d		
NID_NTC	8	3 d		

*Table 28: Balise Group content for Step 58 at default process to reach L2*

Step 58 : Message 8 - Acknowledgement of Train Data (RBC n? 1)				
Distance	50.00 m	Delay :	5.00 s	Conditional Message Id : 129
			Back Delay :	5.00 s
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	8 d		
L_MESSAGE	10	14 d		
T_TRAIN	32	0 d		
M_ACK	1	0 b		
NID_LRBG	24	5767169 d		
T_TRAIN	32	0 d		

## A.4 Definition of the default process to reach L3

- A.4.1.1 Note: In principle, L3 is not used in the TSs. However, as some TCs of [5] request the use L3, a default process to reach L3 might be used in some TSs of [6].

*Table 29: Default SoM to use to reach L3*

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
Feature 4060300: 4.6.3: Transitions Conditions Table											
Test Case 10: The ETCS on-board equipment is powered .Transition Condition Id [4].											
1	1	0.00	N/A	NP	ERTMS/ETCS on-board unit is powered up	I	INT	The on-board equipment changes to SB mode.	N/A	NP	-
2	2	0.00	N/A	NP	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=6) is recorded	O	JRU	-	N/A	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure											
Test Case 24: Start of Mission procedure is engaged											
3	1	0.00	N/A	SB	Driver opens desk	I	TIU	-	N/A	SB	-
4	2	0.00	N/A	SB	The 'CAB STATUS' message is RECORDED with the variable M_CAB_A_STATUS=1 (Active).	O	JRU	-	N/A	SB	-
5	3	0.00	N/A	SB	The actual mode SB is DISPLAYED	O	DMI	The SB indication after opening the desk may not be recorded. Because the change of mode was already recorded while desk was closed	N/A	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure											
Test Case 7: The on-board equipment requests the driver to enter a driver ID within the scope of the Start of Mission procedure in SB mode when the status of the driver ID is unknown.											
6	1	0.00	N/A	SB	The on-board equipment requires the driver to enter a Driver ID There is NO initial Driver ID value displayed	O	DMI	Starting conditions : There is no value initially displayed since the status of the driver ID is unknown.	N/A	SB	-
7	2	0.00	N/A	SB	The on-board equipment prevents the driver from continuing the procedure before the validation of the Driver ID is done.	O	DMI	-	N/A	SB	-
8	3	0.00	N/A	SB	The driver enters and validates a correct Driver ID	I	DMI	-	N/A	SB	-
9	4	0.00	N/A	SB	The validated Driver ID is recorded on the JRU with the DRIVER_ID variable in a 'GENERAL MESSAGE'.	O	JRU	A 'GENERAL MESSAGE' is recorded every 5s by the on-board equipment.	N/A	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure											
Test Case 10: Within the scope of the Start of Mission procedure in SB mode, the status of the ERTMS/ETCS Level data is INVALID. The driver selects a level (the existing ERTMS/ETCS Level or a new one).											
10	1	0.00	N/A	SB	The driver selects "Level <L0/LNTC/L1/L2/L3>"	I	DMI	Depending on the implementation, a list of available levels may be presented to the driver on the DMI. The driver is then allowed to select one level among the proposed levels. For NTC levels, the abbreviations of the concerned National Systems shall be presented to the driver.  The Driver selects L1	L1	SB	-
11	2	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVERACTIONS=<34/35/36/37/38>) is recorded	O	JRU	-	L1	SB	-
12	3	0.00	L1	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_LEVEL=<0/1/2/3/4>) is recorded	O	JRU	-	L1	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure											
Test Case 6: Within the scope of the Start of Mission procedure in SB mode, the On-Board equipment offers the driver to select either SH or NL or 'Train Data Entry' before the on-board equipment requests the driver to enter a complete set of Train Data. The driver selects 'Train Data Entry'.											
13	1	0.00	L1	SB	The driver can select either SH or NL or 'Train Data Entry'	O	DMI	Starting conditions The 'Non-Leading' button is enabled if the 'non leading' input signal is received.	L1	SB	-
14	2	0.00	L1	SB	The driver selects 'Train Data Entry'	I	DMI	-	L1	SB	-
15	3	0.00	L1	SB	A Train data window is displayed on the DMI.	O	DMI	-	L1	SB	-
16	4	0.00	L1	SB	The driver's selection is recorded on the JRU.	O	JRU	-	L1	SB	-
Feature 5040300: 5.4.3: Table of requirements for 'Start of Mission' procedure											
Test Case 47: The on-board equipment requests the driver to enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when the status of the Train Data is unknown (S12)											

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
18	1	0.00	L1	SB	The on-board equipment requires the driver to enter all Train Data unknown by the on-board equipment and prevents the driver from performing any other actions.	O	DMI	The driver might be requested to enter the 'Train category(ies)', 'Train length', 'Traction / brake parameters', 'Maximum train speed', 'Loading gauge', 'Axle load category', 'Train fitted with airtight system', but the driver shall never be requested to enter the 'Traction system(s) accepted by the engine', 'List of National Systems available on-board' or 'Axle number'.	L1	SB	-
19	2	0.00	L1	SB	The driver enters each Train data unknown on-board	I	DMI	-	L1	SB	-
20	3	0.00	L1	SB	The driver is allowed to validate the train data	O	DMI	A complete set of valid Train Data is available	L1	SB	-
21	4	0.00	L1	SB	The driver validates the train data.	I	DMI	The on-board equipment allows the driver to validate as soon as a valid and complete set of Train Data is entered.	L1	SB	-
22	5	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11) is recorded	O	JRU	Triggered by : The driver validation.	L1	SB	-
23	6	0.00	L1	SB	TRAIN DATA (NID_MESSAGE_JRU=2) is recorded	O	JRU	Triggered by : Data Entry completed	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 46:</b> After the set of Train Data has been entered/re-validated by the driver (in S12), if the status of the Train running number is 'unknown', the ERTMS/ETCS on-board equipment requests the driver to enter the Train running number (S13)											
25	1	0.00	L1	SB	The driver is requested to enter the Train running number.	O	DMI	-	L1	SB	-
26	2	0.00	L1	SB	The driver enters the "Train Running Number" [MAIN]	I	DMI	Entered Train Running Number: NID_OPERATIONAL_1	L1	SB	-
27	3	0.00	L1	SB	ADDITIONAL DATA (NID_MESSAGE_JRU=24; NID_OPERATIONAL=NID_OPERATIONAL_1) is recorded	O	JRU	-	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 1:</b> The on-board equipment requests the driver to re-validate/enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when level is 0/1/NTC (Subset-026-5.4.3.2 S12). The driver is requested to enter/re-validate the Train running number if the status of the Train running number is 'unknown' or 'invalid'.											
28	3	0.00	L1	SB	The DMI allows the driver to select the option 'START'.	O	DMI	-	L1	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 16:</b> The driver selects 'Start' within the scope of the Start of Mission procedure in SB mode and in ERTMS Level 1.											
29	1	0.00	L1	SB	The driver selects 'Start'.	I	DMI	-	L1	SB	-
30	2	0.00	L1	SB	Driver's selection of 'Start' is recorded on the JRU	O	JRU	Triggered by: The driver acts on the on-board DMI.	L1	SB	-
31	3	0.00	L1	SB	An acknowledgement request for running in Staff Responsible mode is displayed on the DMI	O	DMI	The on-board equipment will then waits for the driver to acknowledge the acknowledgement request for running in Staff Responsible mode	L1	SB	-
32	4	0.00	L1	SB	The acknowledgement request for running in Staff Responsible mode is recorded	O	JRU	-	L1	SB	-
33	5	0.00	L1	SB	The driver acknowledges 'Staff Responsible'	I	DMI	Symbol MO10	L1	SB	-
34	6	0.00	L1	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVER_ACTIONS= 0000 0011) is recorded	O	JRU	-	L1	SB	-
35	7	0.00	L1	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=2) is recorded	O	JRU	-	L1	SR	-
36	8	0.00	L1	SR	The Mode symbol 'Staff Responsible' is displayed	O	DMI	-	L1	SR	-
37	9	0.00	L1	SR	DMI SYMBOL STATUS (NID_MESSAGE_JRU=21; DMI_SYMB_STATUS=<Bit24=1>) is recorded	O	JRU	-	L1	SR	-

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
<b>Feature 5100100:</b> 5.10.1: Level Transitions General requirements <b>Test Case 36:</b> The train receives an order to switch immediately from L1 to L3 at the current position. On-board equipment immediately switches to L3.											
39	1	50.00	L1	SR	The train reaches the Level transition border and an order to switch immediately to Level 3 is received from balise group BGa: Packet 41: 'Level Transition Order' is RECEIVED. D_LEVELTR= 0 or = 32767 M_LEVELTR=4	I	BTM	-	L1	SR	-
<b>Feature 3050300:</b> 3.5.3: Establishing a communication session <b>Test Case 22:</b> System version is compatible and session is established.											
41	1	50.00	L1	SR	One Balise Group message (NID_RBC?16383) containing packet 42 (NID_RADIO ? FFFF FFFF FFFF FFFF) is received	I	BTM	Not use last known RBC and don't use short number.	L1	SR	-
42	2	50.00	L1	SR	TELEGRAM FROM BALISE (NID_MESSAGE_JRU=6) is recorded	O	JRU	-	L1	SR	-
<b>Feature 5100100:</b> 5.10.1: Level Transitions General requirements <b>Test Case 36:</b> The train receives an order to switch immediately from L1 to L3 at the current position. On-board equipment immediately switches to L3.											
43	3	50.00	L1	SR	Level 3 is DISPLAYED	O	DMI	(Except in SL mode) The On-board equipment switches to Level 3.	L3	SR	-
44	4	50.00	L3	SR	The new Level L3 is RECORDED	O	JRU	-	L3	SR	-
<b>Feature 3050300:</b> 3.5.3: Establishing a communication session <b>Test Case 22:</b> System version is compatible and session is established.											
45	3	50.00	L3	SR	SA-CONNECT.Request is transmitted	O	RTM	According to EURORADIO specifications. This attempt shall be repeated until successful.  The onboard tries to set up a connection with the phone number included in the session management packet.	L3	SR	-
46	4	50.00	L3	SR	SA-CONNECT.Confirm is received	I	RTM	-	L3	SR	-
47	5	50.00	L3	SR	The Status symbol "Safe radio connection - Connection Up" is displayed	O	DMI	-	L3	SR	-
48	6	50.00	L3	SR	JRU step 'DMI SYMBOL STATUS (NID_MESSAGE_JRU=21; DMI_SYMB_STATUS=<Bit40=1>) is recorded'.	O	JRU	-	L3	SR	-
49	7	50.00	L3	SR	SA-DATA.Request with Euroradio Message "Initiation of a communication session" (NID_MESSAGE=155) is transmitted	O	RTM	-	L3	SR	-
50	8	50.00	L3	SR	MESSAGE TO RBC (NID_MESSAGE_JRU=10) is recorded	O	JRU	-	L3	SR	-
51	9	50.00	L3	SR	SA-DATA.Indication with Euroradio Message "RBC/RIU System Version" (NID_MESSAGE=32) is received	I	RTM	System versions M_VERSION (Version of the ERTMS/ETCS language) are compatible, so that the communication session established for on-board	L3	SR	-
52	10	50.00	L3	SR	MESSAGE FROM RBC (NID_MESSAGE_JRU=9) is recorded	O	JRU	-	L3	SR	-
53	11	50.00	L3	SR	SA-DATA.Request with Euroradio Message "Session Established" (NID_MESSAGE=159) is transmitted	O	RTM	-	L3	SR	-
54	12	50.00	L3	SR	MESSAGE TO RBC (NID_MESSAGE_JRU=10) is recorded	O	JRU	-	L3	SR	-
<b>Feature 4080401:</b> 4.8.4: Accepted Information depending on the modes - Acknowledgement of train data <b>Test Case 1:</b> Radio message with new Train Data and acknowledge of the RBC											
56	1	50.00	L3	SR	SA-DATA.Request with Euroradio Message "Validated Train Data" (NID_MESSAGE=129) is transmitted	O	RTM	Validated train data	L3	SR	-
57	2	50.00	L3	SR	MESSAGE TO RBC (NID_MESSAGE_JRU=10; NID_MESSAGE=129) is recorded	O	JRU	-	L3	SR	-

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
58	3	50.00	L3	SR	SA-DATA.Indication with Euroradio Message "Acknowledgement of Train Data" (NID_MESSAGE=8) is received	I	RTM	-	L3	SR	-
59	4	50.00	L3	SR	MESSAGE FROM RBC (NID_MESSAGE_JRU=9; NID_MESSAGE=8) is recorded	O	JRU	-	L3	SR	-

**Table 30: DMI Events for Step 10 at default process to reach L3**

Step 10: DMI Events Distance 0.00 m		
Event Id.	Event Name	Data
29	Request Change Level	LEVEL=0

**Table 31: Balise Group content for Step 39 at default process to reach L3**

Step 39 : Balise Group BG 1 d 1/2 Distance 50.00 m				
Variable	Length	Value	Comment	User comment
Q_UPDOWN	1	1 b		
M_VERSION	7	0100000 b		
Q_MEDIA	1	0 b		
N_PIG	3	0 d		
N_TOTAL	3	1 d		
M_DUP	2	00 b		
M_MCOUNT	8	0 d		
NID_C	10	352 d		
NID_BG	14	1 d		
Q_LINK	1	1 b		
NID_PACKET	8	41 d	Level transition order	
Q_DIR	2	01 b		
L_PACKET	13	63 d		
Q_SCALE	2	01 b		
D_LEVELTR	15	0 d		
M_LEVELTR	3	4 d		
L_ACKLEVELTR	15	0 d		
N_ITER	5	0 d		
NID_PACKET	8	42 d	Session management	
Q_DIR	2	01 b		
L_PACKET	13	113 d		
Q_RBC	1	1 b		
NID_C	10	352 d		
NID_RBC	14	1515 d		
NID_RADIO	64	003265342101FFFF h		
Q_SLEEPSESSION	1	0 b		
NID_PACKET	8	255 d	End of information	

**Table 32: Balise Group content for Step 39 at default process to reach L3**

Step 39 : Balise Group BG 1 d 2/2 Distance 55.00 m				
Variable	Length	Value	Comment	User comment
Q_UPDOWN	1	1 b		
M_VERSION	7	0100000 b		
Q_MEDIA	1	0 b		
N_PIG	3	1 d		
N_TOTAL	3	1 d		
M_DUP	2	00 b		
M_MCOUNT	8	0 d		
NID_C	10	352 d		
NID_BG	14	1 d		
Q_LINK	1	1 b		
NID_PACKET	8	255 d	End of information	

*Table 33: Radio message content for Step 49 at default process to reach L3*

Step 49 : Message 155 - Initiation of a Communication Session (RBC n? 1)				
Distance	50.00 m			
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	155 d		
L_MESSAGE	10	10 d		
T_TRAIN	32	0 d		
NID_ENGINE	24	76000 d		

*Table 34: Radio message content for Step 51 at default process to reach L3*

Step 51 : Message 32 - RBC/RIU System Version (RBC n? 1)				
Distance	50.00 m	Delay :	5.00 s	Conditional Message Id : 155 Back Delay : 5.00 s
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	32 d		
L_MESSAGE	10	11 d		
T_TRAIN	32	0 d		
M_ACK	1	0 b		
NID_LRBG	24	16777215 d		
M_VERSION	7	0100000 b		

*Table 35: Radio message content for Step 53 at default process to reach L3*

Step 53 : Message 159 - Session Established (RBC n? 1)				
Distance	50.00 m			
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	159 d		
L_MESSAGE	10	29 d		
T_TRAIN	32	0 d		
NID_ENGINE	24	76000 d		
NID_PACKET	8	3 d	Onboard telephone numbers	
L_PACKET	13	154 d		
N_ITER	5	2 d		
NID_RADIO	64	1111FFFFFFFFFFFF h		
NID_RADIO	64	1112FFFFFFFFFFFF h		

*Table 36: Radio message content for Step 56 at default process to reach L3*

Step 56 : Message 129 - Validated Train Data (RBC n? 1)				
Distance	50.00 m			
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	129 d		
L_MESSAGE	10	40 d		
T_TRAIN	32	0 d		
NID_ENGINE	24	76000 d		
NID_PACKET	8	0 d	Position report	
L_PACKET	13	114 d		
Q_SCALE	2	01 b		
NID_LRBG	24	5767169 d		
D_LRBG	15	150 d		
Q_DIRLRBG	2	01 b		
Q_DLRBG	2	01 b		
L_DOUBTOVER	15	0 d		

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

Step 56 : Message 129 - Validated Train Data (RBC n? 1)				
Distance	50.00 m			
Variable	Length	Value	Comment	User comment
L_DOUBTUNDER	15	0 d		
Q_LENGTH	2	00 b		
V_TRAIN	7	7 d		
Q_DIRTRAIN	2	01 b		
M_MODE	4	0010 b		
M_LEVEL	3	4 d		
NID_PACKET	8	11 d	Validated train data	
L_PACKET	13	126 d		
NC_CDTRAIN	4	7 d		
NC_TRAIN	15	4 d		
L_TRAIN	12	40 d		
V_MAXTRAIN	7	80 d		
M_LOADINGGAUGE	8	00000001 b		
M_AXLELOADCAT	7	7 d		
M_AIRTIGHT	2	01 b		
N_AXLE	10	4 d		
N_ITER	5	1 d		
M_VOLTAGE	4	3 d		
NID_CTRACTION	10	15 d		
N_ITER	5	2 d		
NID_NTC	8	2 d		
NID_NTC	8	3 d		

*Table 37: Radio message content for Step 58 at default process to reach L3*

Step 58 : Message 8 - Acknowledgement of Train Data (RBC n? 1)				
Distance	50.00 m	Delay :	5.00 s	Conditional Message Id : 129
			Back Delay :	5.00 s
Variable	Length	Value	Comment	User comment
NID_MESSAGE	8	8 d		
L_MESSAGE	10	14 d		
T_TRAIN	32	0 d		
M_ACK	1	0 b		
NID_LRBG	24	5767169 d		
T_TRAIN	32	0 d		

## A.5 Definition of the default SoM to use in LNTC

*Table 38: Default SoM to use in LNTC*

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
<b>Feature 4060300:</b> 4.6.3: Transitions Conditions Table <b>Test Case 10:</b> The ETCS on-board equipment is powered .Transition Condition Id [4].											
1	1	0.00	N/A	NP	ERTMS/ETCS on-board unit is powered up	I	INT	The on-board equipment changes to SB mode.	N/A	NP	-
2	2	0.00	N/A	NP	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=6) is recorded	O	JRU	-	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 24:</b> Start of Mission procedure is engaged											
3	1	0.00	N/A	SB	Driver opens desk	I	TIU	-	N/A	SB	-
4	2	0.00	N/A	SB	The 'CAB STATUS' message is RECORDED with the variable M_CAB_A_STATUS=1 (Active).	O	JRU	-	N/A	SB	-
5	3	0.00	N/A	SB	The actual mode SB is DISPLAYED	O	DMI	The SB indication after opening the desk may not be recorded. Because the change of mode was already recorded while desk was closed	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 7:</b> The on-board equipment requests the driver to enter a driver ID within the scope of the Start of Mission procedure in SB mode when the status of the driver ID is unknown.											
6	1	0.00	N/A	SB	The on-board equipment requires the driver to enter a Driver ID There is NO initial Driver ID value displayed	O	DMI	Starting conditions : There is no value initially displayed since the status of the driver ID is unknown.	N/A	SB	-
7	2	0.00	N/A	SB	The on-board equipment prevents the driver from continuing the procedure before the validation of the Driver ID is done.	O	DMI	-	N/A	SB	-
8	3	0.00	N/A	SB	The driver enters and validates a correct Driver ID	I	DMI	-	N/A	SB	-
9	4	0.00	N/A	SB	The validated Driver ID is recorded on the JRU with the DRIVER_ID variable in a 'GENERAL MESSAGE'.	O	JRU	A 'GENERAL MESSAGE' is recorded every 5s by the on-board equipment.	N/A	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 10:</b> Within the scope of the Start of Mission procedure in SB mode, the status of the ERTMS/ETCS Level data is INVALID. The driver selects a level (the existing ERTMS/ETCS Level or a new one).											
10	1	0.00	N/A	SB	The driver selects "Level <L0/LNTC/L1/L2/L3>"	I	DMI	Depending on the implementation, a list of available levels may be presented to the driver on the DMI. The driver is then allowed to select one level among the proposed levels. For NTC levels, the abbreviations of the concerned National Systems shall be presented to the driver.  The Driver selects LNTC	LNTC	SB	-
11	2	0.00	LNTC	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11; M_DRIVERACTIONS=<34/35/36/37/38>) is recorded	O	JRU	-	LNTC	SB	-
12	3	0.00	LNTC	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_LEVEL=<0/1/2/3/4>) is recorded	O	JRU	-	LNTC	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 6:</b> Within the scope of the Start of Mission procedure in SB mode, the On-Board equipment offers the driver to select either SH or NL or 'Train Data Entry' before the on-board equipment requests the driver to enter a complete set of Train Data. The driver selects 'Train Data Entry'.											
13	1	0.00	LNTC	SB	The driver can select either SH or NL or 'Train Data Entry'	O	DMI	Starting conditions The 'Non-Leading' button is enabled if the 'non leading' input signal is received.	LNTC	SB	-
14	2	0.00	LNTC	SB	The driver selects 'Train Data Entry'	I	DMI	-	LNTC	SB	-
15	3	0.00	LNTC	SB	A Train data window is displayed on the DMI.	O	DMI	-	LNTC	SB	-
16	4	0.00	LNTC	SB	The driver's selection is recorded on the JRU.	O	JRU	-	LNTC	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 47:</b> The on-board equipment requests the driver to enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when the status of the Train Data is unknown (S12)											

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
18	1	0.00	LNTC	SB	The on-board equipment requires the driver to enter all Train Data unknown by the on-board equipment and prevents the driver from performing any other actions.	O	DMI	The driver might be requested to enter the 'Train category(ies)', 'Train length', 'Traction / brake parameters', 'Maximum train speed', 'Loading gauge', 'Axle load category', 'Train fitted with airtight system', but the driver shall never be requested to enter the 'Traction system(s) accepted by the engine', 'List of National Systems available on-board' or 'Axle number'.	LNTC	SB	-
19	2	0.00	LNTC	SB	The driver enters each Train data unknown on-board	I	DMI	-	LNTC	SB	-
20	3	0.00	LNTC	SB	The driver is allowed to validate the train data	O	DMI	A complete set of valid Train Data is available	LNTC	SB	-
21	4	0.00	LNTC	SB	The driver validates the train data.	I	DMI	The on-board equipment allows the driver to validate as soon as a valid and complete set of Train Data is entered.	LNTC	SB	-
22	5	0.00	LNTC	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11) is recorded	O	JRU	Triggered by : The driver validation.	LNTC	SB	-
23	6	0.00	LNTC	SB	TRAIN DATA (NID_MESSAGE_JRU=2) is recorded	O	JRU	Triggered by : Data Entry completed	LNTC	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 46:</b> After the set of Train Data has been entered/re-validated by the driver (in S12), if the status of the Train running number is 'unknown', the ERTMS/ETCS on-board equipment requests the driver to enter the Train running number (S13)											
25	1	0.00	LNTC	SB	The driver is requested to enter the Train running number.	O	DMI	-	LNTC	SB	-
26	2	0.00	LNTC	SB	The driver enters the "Train Running Number" [MAIN]	I	DMI	Entered Train Running Number: NID_OPERATIONAL_1	LNTC	SB	-
27	3	0.00	LNTC	SB	ADDITIONAL DATA (NID_MESSAGE_JRU=24; NID_OPERATIONAL=NID_OPERATIONAL_1) is recorded	O	JRU	-	LNTC	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 1:</b> The on-board equipment requests the driver to re-validate/enter a complete set of Train Data within the scope of the Start of Mission procedure in SB mode when level is 0/1/NTC (Subset-026-5.4.3.2 S12). The driver is requested to enter/re-validate the Train running number if the status of the Train running number is 'unknown' or 'invalid'.											
28	3	0.00	LNTC	SB	The DMI allows the driver to select the option 'START'.	O	DMI	-	LNTC	SB	-
<b>Feature 5040300:</b> 5.4.3: Table of requirements for 'Start of Mission' procedure <b>Test Case 15:</b> The driver selects 'Start' within the scope of the Start of Mission procedure in SB mode and in ERTMS Level NTC.											
29	1	0.00	LNTC	SB	The driver selects 'Start'.	I	DMI	-	LNTC	SB	-
30	2	0.00	LNTC	SB	An acknowledgement request for running under supervision of the selected NTC mode is displayed on the DMI	O	DMI	The on-board equipment will then waits for the driver to acknowledge the acknowledgement request for running in SN mode	LNTC	SB	-
31	3	0.00	LNTC	SB	Driver's selection of 'Start' is recorded on the JRU.	O	JRU	Triggered by : The driver acts on the on-board DMI.	LNTC	SB	-
<b>Feature 4060300:</b> 4.6.3: Transitions Conditions Table <b>Test Case 51:</b> The ETCS on-board equipment switches to SN Mode within the Start of Mission procedure. Transition Condition Id [58].											
34	3	0.00	LNTC	SB	The driver acknowledges 'National System'	I	DMI	-	LNTC	SB	-
35	4	0.00	LNTC	SB	DRIVER'S ACTIONS (NID_MESSAGE_JRU=11: M_DRIVER_ACTIONS= ) is recorded	O	JRU	-	LNTC	SB	-
36	5	0.00	LNTC	SB	GENERAL MESSAGE (NID_MESSAGE_JRU=1; M_MODE=13) is recorded	O	JRU	-	LNTC	SN	-
37	6	0.00	LNTC	SN	The Mode symbol 'National System' is displayed	O	DMI	DMI Object: MO19 Or USE_FT4070201.12: Indication of NTC National mode to the driver.	LNTC	SN	-

# EUROPEAN UNION AGENCY FOR RAILWAYS ERTMS UNIT

## ETCS TEST PLAN AND METHODOLOGY FOR SS-076

SEQUENCE OF TEST											
Step	Row	Dist. (m)	Previous		Description of Events	I/O	Interface	Comments	Next		Test Result
			Levels	Mode					Levels	Mode	
38	7	0.00	LNTC	SN	DMI SYMBOL STATUS (NID_MESSAGE_JRU=21; DMI_SYMB_STATUS=<Bit34=1>) is recorded	O	JRU	-	LNTC	SN	-

*Table 39: DMI Events for Step 10 at default SoM to use in LNTC*

Step 10: DMI Events Distance 0.00 m		
Event Id.	Event Name	Data
29	Request Change Level	LEVEL=NTC

## Annex B      AN EXAMPLE OF THE BRAKING CURVES CALCULATION

- B.1.1.1      The file below contains the results of the braking curves for testing the FT3131040.TC2 with a Gamma 1 train and a Lambda 1 train in two different TSs (Subset-076-6-3\_3131040\_03\_v310.mdb                      and                      Subset-076-6-3\_3131040\_03\_v310.mdb, respectively):



Subset-076-6-3\_3131040\_03\_v310.xlsx



Subset-076-6-3\_3131040\_04\_v310.xlsx