ERTMS UNIT

TEST SEQUENCE VALIDATION AND EVALUATION FOR SS-076

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1. OBJECTIVE

1.1 Foreword

1.1.1.1 Not Applicable

1.2 Scope & field of application

1.2.1.1 The objective of this document is providing a set of rules related to the way in which Test Sequences execution results must be evaluated and to the validation ranges which will be used when testing ERTMS/ETCS onboard equipments according to the Ss-076.

1.2.1.2 For the scope of this document, when referring to the compliance with Ss-026 it shall be understood that as the Ss-026 v230 plus the Ss-108 v1.2.0.

1.3 Document description

1.3.1.1 Not applicable

2. REFERENCES AND ABBREVIATIONS

2.1 Reference documents

Table 1 : Reference documents

Ref. N°	Document Reference	Title	Last Issue
[1]	SUBSET-023	Glossary of Terms and Abbreviations	2.0.0
[2]	SUBSET-026	System Requirement Specification	2.3.0
[3]	SUBSET-27	FFFIS Juridical Recorder-Downloading tool	2.3.0
[4]	SUBSET-076-5-2	Test Cases	2.3.3
[5]	SUBSET-076-6-3	Test Sequences	2.3.3
[6]	SUBSET-108	Interoperability-related consolidation on TSI annex A documents	1.2.0

2.2 Abbreviations

Table 2 : Abbreviations

Abbreviation	Meaning
CR	Change Request
ERA	European Railway Agency
TS	Test Sequence
Ss	Subset

3. TEST SEQUENCE EVALUATION

3.1 Introduction

3.1.1.1 The test sequence evaluation shall be understood as the process where the test sequence results for each step is checked against the reference sequence. At this process the functional behavior of the steps is checked i.e. the expected result defined in each step of the sequence [5] is compared with the step result of the test.

3.2 Type of steps

3.2.1.1 A Test Sequence contains a list of steps with the corresponding description and additional information. The evaluation of the Test Sequence shall be done step by step.

3.2.1.2 Every step is normally referred to an interface, where the step check shall be done. According to the interface nature, the steps are classified in the following categories:

a) Input (BTM, DMI, RTM, LTM, TIU, ODO). The inputs in the ERTMS/ETCS on board equipment are, in fact, an output from the lab environment. In this case, the evaluation of the step consists of checking if the lab has produced the corresponding entry within the expected time and distance (i.e, balise telegram delivery, driver action, etc), which will be done every time a TS is executed.

b) Output (DMI, RTM, TIU, JRU). The outputs from the ERTMS/ETCS on board equipment are the reactions to the programmed entries. For the evaluation, it has to be checked, firstly, if the event has been produced. In second place, it has to be checked at what distance/location and time it happened. The DMI and JRU interfaces are especially critical. In these cases when an inconsistency exists between the SRS and the related subsets, the validation of these steps shall be done according to the Ss-026 [2] plus Ss-108 [6].

c) Not applicable. The step are not applicable because they are considered an error in the test sequence design.

d) No interface. Some steps within the Test Sequence have no interface attached. They can be classified as follows:
    a) The steps are merely informative.
    b) The steps describe an internal functionality.
    c) The evaluation report will include how the steps without interface have been classified and also why those steps are evaluated or not and the method used for the possible evaluation.

3.2.1.3 The step classification shall be done by the laboratory prior to the execution of a Test Sequence if the classification was not available because of a modification in the sequence (see 5.2).

3.2.1.3.1 Note 1: The evaluation of the input steps is aimed to check the good execution of each TSs. The check of the performance of the laboratory tools is out of the scope of this document

3.2.1.3.2 Note 2: The evaluation margins of time and distance for both Input and Output steps are defined in this document

3.2.1.4 The number and the granularity of the entries used as proof of a step validation should depend on the step description. Nevertheless, several entries with different granularity can be used as proof as the step validation if the step description requires it.

3.2.1.4.1 Note: The step description includes the step comments.

3.3 Evaluation of steps:

3.3.1.1 Once a test sequence has been run, the evaluating lab and after discussion with the customer, shall classify each step result of this sequence [5] in one of the following categories:

a) “passed”, this category applies to step that has been reproduced in the laboratory as foreseen in the sequence. If it is an “Input” step it means that the the lab and/or the operator behaved correctly according to the test sequence step description. If it is an “Output” step it means that the on-board equipment behaviour is according to the test sequence step description.

b) “non-passed”, this category applies to “Output” steps where the onboard equipment behavior is not in line with the test sequence step description. This step evaluation shall referred to the Ss-026 [2] requirement not respected.

c) “passed with comments”, this category applies to different range of values for ETCS variables to the ones used in the Ss-076, optional packets implemented by the supplier, Change Request classified as error in the ERA CR Database or not alignment of the DMI or JRU implementations by the supplier. This step evaluation shall refer to one of the possibilities aforementioned.

d) "Optional functionality", this category applies to optional functionalities defined in Ss-026 [2] or allowed designer choices by the Ss-026 [2] and Ss-108 [6].

   Note: If a supplier has implemented a designer choice, the implementation shall not divert from the agreed solution.

e) Not applicable, this category applies to any step that has no associated interface in the test sequence.

f) Test Sequence error, this category applies for detected errors of a test sequence.

g) "Linked to previous error", this category applies to steps that can not be evaluated because a previous error has occurred in the test sequence. This shall deal with linked steps, i.e. a first step triggers one or several steps. With this classification it is possible to distinguish between the source error and the inherited errors.

3.3.1.2 Note: Test sequence errors must be shared with ERA and other accredited laboratories.

3.3.1.3 When evaluating the steps in a sequence, other steps not include it in the sequence could happen (e.g. JRU data recording), these steps not foreseen by the test sequence must not be evaluated.

4. TIME AND DISTANCE VARIABLES ASSESSMENT

4.1 Introduction

4.1.1.1 The test sequence validation shall be understood as the process to evaluate where the ranges in time and distance has been respected by the test results compared to the original test sequence.

4.2 Types of validation ranges (time or distance)

4.2.1 Overview

4.2.1.1 Most of the situations specified in the steps of the Test Sequences shall be validated based on time and distance intervals.

4.2.1.2 The specific situations in which distance ranges shall apply are defined in 4.2.4.

4.2.1.3 For the steps describing a specific action that happens at a precise time, the following sections apply. Because of their description and comments, some steps will be validated by using other time/distance intervals than the ones defined at points 4.3 and 4.4. In these cases, the time/distance intervals will depend on the step description/comments or, if the step description/comments are not enough detailed, on the Test Sequence context.

4.2.1.4 There are several systems recording the events entries (e.g. the test bench, the JRU, the video recording system ...), each recording system can be allocated to the devide under test or the test architecture. Each of these recording systems has its clock. During the validation phase, the timestamp of all entries used for the validation coming from all recording system shall be synchronized or an offset interval shall be identified with regards to the reference time selected.

4.2.1.5 To ensure the proper reconstruction of the right sequence of events all timestamp offsets shall remain within the tolerances defined in Chapter 4. The tolerances on the time/distances intervals due to time synchronization problems of the different data sources used to retrieve the validation entries, are included in the actual values of those time/distance intervals.

4.2.2 Validation based on time intervals

4.2.2.1 All the test sequences have the distance at which the step must be checked, specified in each one of the steps. The validation range is defined in the following way:

4.2.2.1.1 The train gets to the distance specified in the step in time “t” (if there are exceptions, and another “t” must be used as the base of the interval, it will be clearly explained in the following sections).

4.2.2.1.2 The range for the validation shall be within [t – t1, t + t2].

4.2.2.1.3 t1 and t2 are defined for each interface.

4.2.2.1.4 Each interface can have different t1 and t2 for different situations. For example, in the DMI interface, a different range can be used when the DMI displays an event, or when the driver interacts with the DMI (note that it takes more time for the driver to act on the DMI). The durations t1 and t2 are specified in the following sections, taking into account the different situations in each interface.

4.2.3 Validation according to distance intervals

4.2.3.1 All the test sequences have the distance at which the step must be checked, specified in each one of the steps. The validation range is defined in the following way:

4.2.3.1.1 The distance of the step is the basis of the interval, which will be called distance "d"

4.2.3.1.2 The range for the validation shall be within [d – d1, d + d2].

4.2.3.1.3 d1 and d2 are defined for each interface, if needed.

4.2.3.1.4 Each interface can have different d1 and d2 for different situations.

4.2.3.1.5 As the general rule for validation is time intervals, the situations which require distance ranges are specified in section 4.3.

4.2.4 Situations in which distance ranges shall be used

4.2.4.1 When the speed of the train is zero (see section 4.4). Note that if mutually dependent events occur at standstill the validation of these shall be based on the distance and the time.

4.3 Validation ranges at the different interfaces

4.3.1 BTM

The on board equipment shall not be validated in steps specified at the BTM interface as it is not possible to check if the BTM has received the telegrams sent by a balise group (at least in the BTM steps, although this is checked in the following JRU steps). Therefore these steps shall be used to check if the laboratory has sent each balise telegram in the balise group at the expected position, i. e. the train has been stimulated at the right moment:

Table 3 : BTM times

Definition	Time
t1	1 second
t2	1 second

4.3.2 RTM

4.3.2.1 When a dialog of radio messages is specified between the trackside and the train in a Test Sequence, the following general rules have been applied:

a) Mostly messages (track to train and train to track) are written in the same distance although the train is moving.

b) A time “delay” can be added to the track to train messages. This means that, when the train gets to the distance of the step in time t, the message is sent by the laboratory at t + delay. This way, although most of the messages are written in the same step distance, by means of the delay, the time in which they are sent can be fixed. This is the mandatory way of specifying radio dialogs when the train is at standstill. When the train is moving, it is not necessary to use the delays, but they should be used, so that the radio dialogs are always specified in the same way.

c) The messages train to track are also specified at the same distance, no delay is associated to them. If there is a train to track message, and in the sequence of steps appears after a track to train message, this message shall be found after the previous track to train message, and the distance specified in the step shall not be taken into account (if it is the same as the one in the track to train message, as mentioned before).

d) A “back delay” can also be added to the track to train messages. If it is added, it is also checked that a train to track message was received in the interval which is set by the “back delay”. This interval can be defined as a time or distance. Therefore, it is not necessary to define any range in this document for the “back delays”, apart from the guidelines for the test sequences design given in 5.4 of this document. The back delay itself is the range to be used for the validation, and it has already been written in each sequence.

4.3.2.2 Inputs (messages track to train)

4.3.2.2.1 The on-board equipment shall not be validated in these steps as it is not possible to check if the RTM has received the radio messages (at least in these steps, since this is checked in the following JRU steps). Therefore these steps shall be used to check if the laboratory has sent the radio messages at the expected position i. e. the train has been stimulated in the right moment. The range which

must be used for the validation is (supposing an error free transmission) [t - t1, t + t2], where t is the time when the train gets to the distance of the step, plus the delay associated to the RTM message:

Table 4 : RTM Inputs times

Definition	Time
t1	2 seconds
t2	2 seconds

4.3.2.3 Outputs (messages train to track)

4.3.2.3.1 As explained in the first section of this chapter, the train to track messages shall be found after the previous track to train message if the distance written in their steps is the same. The range that shall be used is

4.3.2.3.2 [t – t1, t + t2], where t is the time when the previous track to train message was sent, if they both are at the same distance.

4.3.2.3.3 If the train to track message has to be sent after an event, which is different from a track to train message, the time interval shall be [t – t1, t + t2], where t is the time when the event that triggers the transmission of the radio message takes place (this event can be the previous train to track message, a driver's action on the DMI, etc.).

4.3.2.3.3.1 If the message is not part of a dialog and the distance written in the step is different from the one from the previous track to train message, t is the time when the train gets to the distance written in the step.

Table 5 : RTM Outputs times

Definition	Time
t1	0 seconds
t2	10 seconds

4.3.2.4 Variables validated at the outputs (train to track)

4.3.2.4.1 The variables of these messages, which shall be validated, are the ones specified in the Test Sequence. Some variables could depend on the position of the train, such as the distance in the position reports, or are unknown or not defined when the Test Sequence is executed, so the variables shall validated taking into account the sequence execution context and the value range defined in the Ss-026 [2].

4.3.3 DMI

4.3.3.1 Outputs

4.3.3.1.1 The outputs of the DMI are messages, changes, or enabled/disabled buttons displayed. Therefore these events are displayed by the DMI at the distance which is specified in the step. The following range shall be used to validate this kind of steps:

Table 6 : DMI Outputs times

Definition	Time
t1	5 seconds
t2	10 seconds

4.3.3.2 Inputs

4.3.3.2.1 The inputs to the DMI are actions which are performed by the driver. As it takes some time for the driver to read the DMI and perform the action required, the range defined for this kind of steps has this into account, and therefore it is a wider range.

4.3.3.2.2 The reference time “t” shall be one of the following two options:

a) the time when the button or message on which the driver must act becomes available for him, such as when an acknowledgment is shown, or a button is enabled.

b) the time when the train gets to the distance defined on the steps which needs to be validated.

Table 7 : DMI Inputs times

Definition	Time
t1	5 seconds
t2	10 seconds

4.3.3.2.3 Note: t2 will be different from 10s (e.g. 5s for most of the required acknowledgements) in the special cases where it is necessary to acknowledge something on the DMI that, if not performed in due time, can make the steps coming afterwards fail.

4.3.3.3 Special case: the driver doesn’t acknowledge within 5 seconds

Table 8 : DMI Inputs times (no ack from driver within 5 seconds)

Definition	Time
t1	0 seconds

Table 8 : DMI Inputs times (no ack from driver within 5 seconds)

Definition	Time
t2	5 seconds

4.3.4 TIU

4.3.4.1 Outputs

4.3.4.1.1 The outputs of the TIU are the signals which are tested in the laboratory. The general range that shall be used.

Table 9 : TIU Outputs times

Definition	Time
t1	5 seconds
t2	10 seconds

4.3.4.2 Application or release of the brakes due to braking curves or overspeeds (special case)

4.3.4.2.1 Due to the nature of the braking curves and to how the Test Sequences are specified, the distance in which the brakes will be applied or released is not well defined. Therefore, a wide range will be used for these specific situations.

Table 10 : TIU Inputs times - Application or release of the brakes due to braking curves or overspeeds

Definition	Time
t1	5 seconds
t2	10 seconds

4.3.4.3 Inputs

4.3.4.3.1 The inputs are stimulated by the laboratory. Therefore, in this kind of steps, the on board equipment is not tested. However the step is validated to ensure that the train was stimulated in the right moment. The laboratory is the one which is tested in these steps. The range defined for this situation is:

Table 11 : TIU Inputs times

Definition	Time
t1	2 seconds
t2	2 seconds

4.3.4.3.2 Nevertheless, the time interval defined in the previous requirement might not be always applicable. For example, for certain Track Conditions, like moving the pantograph or switching on and off the main power switch, the time interval to perform the appropriate action will depend on the programmed answer from the laboratory (the action might be simulated to be automatic or manual). Besides, the reference time "t" can be the moment when the EVC sends the order (Output signal) to execute the Track Condition.

4.3.5 JRU

4.3.5.1 General Range

4.3.5.1.1 The general range, which takes into account the average time the JRU needs to record the information which comes from other interfaces. The following range shall apply with the exceptions of records of driver actions, record of radio messages and warnings due to overspeed. However, there are some exceptions which require a wider range (see next section). This is the general range:

Table 12 : JRU range

Definition	Time
t1	5 seconds
t2	5 seconds

4.3.5.2 Records of driver actions

4.3.5.2.1 According to dSs-026 [2], the driver actions are stored in a specific message in the JRU. Since it takes some time for the driver to perform the action, and for the JRU to record it, the range shall be the one defined for the actions performed by the driver in the DMI (see section 5.3.2) plus the usual time to record something in the JRU (see 4.5.2.1.1). The range for recording driver actions shall be:

Table 13 : Record of driver actions range

Definition	Time
t1	5 seconds
t2	15 seconds

4.3.5.3 Records of radio messages

4.3.5.3.1 Records of radio messages shall be traced using the time stamp when they were sent, it shall be taken into account the time delay (see 4.2.2.1 b)). The range shall be [t – t1, t – t2] where t is the time between the previous RTM message was sent or received.

4.3.5.3.2 t1 and t2 are the values defined in Table 13.

4.3.5.3.3 The RTM messages shall be considered valid in the JRU, if they were previously validated in the RTM interface in order to know the real time when they were sent or received

4.3.5.4 Warnings due to overspeeds

4.3.5.4.1 These situations need a wider range than the general one defined for this interface, due to the fact that the overspeed is not provoked exactly in the distance specified in the step, and depending on the braking curves of the different eurocabs, the step shall take place at different times. The range for warnings due to overspeed shall be:

Table 14 : Record of warnings due to overspeed

Definition	Time
t1	5 seconds
t2	10 seconds

4.4 Validation when the train speed is zero

4.4.1.1 This is a special case which needs a different approach. The general rule (see 4.1) cannot be applied, since the train doesn't get to the distance “x” in time “t”. The train is at distance “x” at any time (until it starts moving again). Therefore the validation shall be done using distance, and the order of the steps shall be also checked (a step could appear twice in the sequence of steps (being the train stopped) and if the validation takes only into account distances, both steps would be validated correctly, although only one occurrence were found, since the same occurrence would be found twice in the distance range).

4.4.1.2 The range which shall be used for all the cases of steps for which the train speed is zero is [d – d1, d + d2] where “d” is the distance defined by the step and where the train is at standstill.

Table 15 : Distances when the train speed is zero

Definition	Lenght
d1	30 meters
d2	30 meters

4.4.1.2.1 Exception: During a forward/backward movement (e.g.: when testing D_NVROLL) when the train is at standstill, the train shall not be considered at standstill and requirements in 4.3 shall not be applicable to those steps.

4.4.2 RTM (Inputs and Outputs)

4.4.2.1 The time interval shall be computed as in section 4.2.2.

4.4.3 DMI Inputs

4.4.3.1 The inputs to the DMI are actions which are performed by the driver. As it takes some time for the driver to read the DMI and perform the required action and as the train is at standstill, the range defined for these kinds of steps has this into account, and therefore it is a wider range.

4.4.3.2 The time interval for validating the DMI Input steps shall be evaluated by the right events happening before and after in the sequence of steps at standstill.

4.4.4 TIU (Inputs and Outputs)

4.4.4.1 The time interval for validating the TIU Input steps shall be evaluated by the right events happening before and after in the sequence of steps at standstill.

4.5 Validation of following steps when steps are non-passed, optional functionality or Not Applicable

4.5.1.1 This section applies to situations where some steps are classified ad non-passed, optional functionality or Not Applicable, and how to continue the test sequence validation.

4.5.1.2 Note: The input steps should always be passed. If it is not the case the TS needs to be re-executed with the required modification until the inputs steps are passed.

4.5.1.3 Note: In the following cases, a step which is not depending on another step is a step whose the time/distance intervals on which its validation is based is calculated from its distance. It is generally the first step of a steps series at the same distance. When a step is depending on another step, this dependant step can not occur if the step on which it depends did not occur. (E.g. : the recording of a JRU step depends most of the time on an previous event on another interface, the driver validation of data depends most of the time of a previous step asking the driver to enter data, …)"

4.5.1.4 The following point describes situations where the step A and the step B are at the same distance in the TS. The Validation should be done according to the following table:

Table 16 : Validation for a Step B when Step A is at same distance in the TS

Step A is validated as	Step B depends on Step A	Step B does not depend on Step A
non-passed because of no entry found	B is non-passed	Individual validation for step B without taking into account Step A
non-passed because of no entry found in time/distance	Linked to previous error	Individual validation for step B without taking into account Step A
Optional functionality	Optional functionality	Individual validation for step B without taking into account Step A
Not applicable	Individual validation for step B without taking into account Step A	Individual validation for step B without taking into account Step A

4.5.1.5 Note: In table 16 "non-passed because of no entry found" means that there is no entry at all while "non-passed because of no entry found in time/distance" means that no entry is found in the time/distance range specified i.e. there is an entry but not at the right time/distance.

5. TEST SEQUENCES EXECUTION

5.1 Principles

5.1.1.1 The following points describe the situations where a Test Sequence cannot be properly tested at some points. The described changes that are made in those situations shall take into account the aim of the particular Test Cases i.e. with a special attention to the Ss-026 requirements that are under test and may be affected by the changes. If this situation arrives, two possibilities can happen:

a) A requirement affected that have already been tested in another test sequence do not need to be taken into account when the test sequence is modified, though it would be convenient to take them into account

b) A requirement affected that it is only tested in this testcase, in such a case the modification of the test seqeuence shall take into account the requirement.

5.1.1.2 None of the following points of this section means that, if the on-board equipment passes the modified TS(s), the on-board equipment shall be considered to have passed the original TS without errors (see section 3.3). Firstly, it shall be ensured that all the requirements covered by the original test sequences are covered during the execution of a test campaign.

5.2 Failures in the execution

5.2.1.1 If an error occurs while executing a Test Sequence, and this error prevents to execute the rest of the sequence, the original TS shall be modified, in order to test as much of the functionality as possible.

5.2.1.2 The aforementioned error can be an error because of the following reasons:

c) Error in the Test Sequence

d) Malfunction of the on-board equipment

e) Not implemented functionality in the on-board equipment

f) Implementation of optional functionalities

5.2.1.3 The laboratory shall justify any modification on the test sequence in the report and gurantee compliance of the new test sequence with the ss-026 [2]. Nevertheless, the number of modifications in a single test sequence shall be as minimum as possible.

5.2.1.4 The modifications in the Test Sequence shall not leave untested any functionality from the original test sequence.

5.2.1.5 The modifications due to optional functions of SRS implemented in the on-board equipment (e.g. designer choices, allowed choices within ETCS functionality,…)

can be solved modifying it without leaving any other functionality uncovered in the Test Sequence.

5.2.1.6 The modifications made to a test sequence shall respect the values defined in section 5.4

5.2.1.7 In case of the error is caused by the on-board equipment ,the Test Sequence might be modified in different ways: it can be splitted in two different TSs, a balise or radio message can be modified or removed, etc.

5.2.1.7.1 If it is decided to split the Test Sequence in two different TSs, the first one shall be defined from the beginning of the original TS to the location where the error happened, and the second one shall start where the first one finishes and shall finish at the end of the original TS. (This could be done more than once for a TS if more than one error of this kind occurs)

5.2.1.7.2 Although the error will occur at a certain step, this does not mean that the second TS will have to start from the following step in the original TS. Eventually, a whole TC will be out of the second TS or even more than one TC might not be possible to be tested in this TS because of the error.

5.2.1.7.3 In the second TS, the Starting Conditions and the first steps (or TCs) shall reach the appropriate state for testing the first TC that is possible to be tested after the step where the error in the original TS occurred. From this TC on, the second TS shall be identical to the original TS.

5.3 Events that depend on the braking model

5.3.1.1 In any TS, after the brakes are applied by the EVC, if an event or a set of events will not happen unless the train has passed a certain location, it shall be ensured that the train passes this location. This might not always be the case when testing a real EVC in the laboratory, since the braking performance is not part of the ETCS Baseline 2.

5.3.1.2 There are two general scenarios in the TSs where the aforementioned problem may occur:

a) While the train is braking, an event (or a set of events) has to be tested (e.g. reading a BG).

b) The train is at standstill after the brakes application and an event (or a set of events) has to be tested which depends on the stop location (e.g. radio messages from the RBC).

5.3.1.3 In those scenarios the TS shall be modified, the laboratory shall avoid any changes in the expected functionality under test, shall respect the step oder and shall apply one of the following sotutions :

a) either to modify the speed profile, so the train can run at a different speed before the brakes are applied

b) or to delay the triggering event for brake application .

c) or to modify the stop location on the basis of the actual location where the on-board equipment under test stops.

5.4 Time Delays

5.4.1.1 The radio and the speed profile timings in the Test Sequences [5] are set to the values of the following table. Nevertheless, if the execution of a Test Sequence is affected by or interrupted due to a particular combination of delays and/or back-delays, those values might be modified in order to make the particular Test Case(s) work properly (as expected). The following time values are not considered manadatory for the onboard equipment, they are just the default values used to build the test sequences and are provided for information:

Table 17 : Time delays

		Timing	
Task	**Level**	**Speed Profile**	**Radio**
Rack-Bootup	all	130s	130s
Msg 155/32	L2	30s	30s/30s
Msg 8/129	L2	30s	30s/30s
Msg 39/156	L2	30s	30s/30s
Msg 506/501	L2	10s	10s/10s
Msg 43/157	L2	10s	10s/10s
Msg 3/132	L2	30s	30s/30s
Msg 6	L2	25s	25s
Start of Mission	L0/L1	50s	-
Entering RBC ID & Phone number	L2	30s	30s
Establishing a radio connection	L2	20s	20s
MA Request timeout	L2	60s	60s
Entering train data	all	20s	20s
Check that all Buttons selectable	all	30s	-

5.4.1.2 Note: In table 17 "Rack-Bootup" means the time needed to transit from NP mode to SB mode

6. TEST REPORT

6.1.1.1 The Ss-076 test report shall contain the following information:

a) Reference documents used

b) An identification of each software and hardware component of the on-board equipment under test

c) An identification of each software and hardware component of the laboratory equipment used for the tests

d) The list of test sequence executed (identifying the original ones and the modified during the test campaign)

e) A justification of the changes introduced in every modified test sequence

f) A justification for every partially or totally non executed test sequence

g) A justification proving that all the requirements covered by the original test sequences modified are still covered by the test sequences used during the test campaign (i.e. executed at least once)

h) A list of Ss-026 requirements not implemented or wrong implemented in the on-board equipment in the following format:

Table 18 : List of requirements for reporting

ID	Ss-026 requirement	Problem description
[01]	*[1.1.1.1]*	
[02]		
[03]		
…		

i) A list of optional functionalities implemented or allowed designer choices by the Ss-026 [2] and Ss-108 [6]

j) A summary list of comments for the “passed with comments” steps (i.e. use of different range of values for ETCS variables to the ones used in Ss-076, optional packets implemented by the supplier, designer choices implemented, detected Change Requests opened in the ERA CR Database or not alignment of the DMI or JRU implementations by the supplier)

k) All the log files (from all available interfaces) from the executed test sequences shall be annexed to the report.