**SUBSET-076 Test Sequence Evaluation at *<Lab Name>***

**Test Report**

**Test Period:** From *<DD/MM/YYY>* to *<DD/MM/YYYY>*

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Name(s) and function(s)** | **Date** | **Signature** |
| **Edited by** |  |  |  |
| **Quality review by** |  |  |  |
| **Approved by** |  |  |  |

|  |  |  |
| --- | --- | --- |
| Contact details of *<Lab Name>* | Corporate Headquarters  and Laboratory | *<Corporate headquarters Address>*  *<Lab Address>* |
| Reporter Contact | *<Contract reference>* | |
| Lab ISO 17025 accreditation reference number | *<Reference>* | |

|  |  |
| --- | --- |
| Client | *<Client Name>* |
| Client Contact | *<Client contact person>* |
| Telephone | *<Client contact person telephone>* |
| Address | *<Client contact person address>* |

*Note:*

*The results of this report only concern the equipment mentioned in this report.*

*This report shall not be reproduced, except in full, without the written permission of <Lab Name>.*

**Document Change Log:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Version** | **Date** | **Author** | **Reviewer** | **Description** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# Table of contents

[Table of contents 3](#_Toc493498706)

[1. Introduction 4](#_Toc493498707)

[2. Reference documents 4](#_Toc493498708)

[3. Terms of reference and acronyms 4](#_Toc493498709)

[4. SW/HW Versions 5](#_Toc493498710)

[4.1. On-board equipment 5](#_Toc493498711)

[4.2. Laboratory equipment 6](#_Toc493498712)

[5. Test campaign 8](#_Toc493498713)

[5.1. General information 8](#_Toc493498714)

[5.2. Test sequence modifications 8](#_Toc493498715)

[5.3. List of the test sequences non-executed 8](#_Toc493498716)

[6. Test sequence evaluation 10](#_Toc493498717)

[6.1. Non-conformities of the on-board equipment with regards to Ss-026 10](#_Toc493498718)

[6.2. Remarks from the expected Test Sequence results 10](#_Toc493498719)

[6.3. Additional issues detected 11](#_Toc493498720)

[7. Log Files 12](#_Toc493498721)

[7.1. Test Sequence management 12](#_Toc493498722)

[8. Conclusions 13](#_Toc493498723)

[8.1. Test Sequence results 13](#_Toc493498724)

[Annex 1. Tests results 14](#_Toc493498725)

[Annex 2. Lab Description 18](#_Toc493498726)

[Annex 3. Log Files 19](#_Toc493498727)

# Introduction

The present report collects results from the tests performed at *<Lab Name>* laboratory in order to prove the technical interoperability and functionality of the ETCS on-board subsystem against requirements of the SUBSET-026 v XXX [[1]](#_Reference_documents). This activity is classified as mandatory in the TSI CCS to issue an EC Declaration of conformity for an ETCS on-board Interoperability Constituent.

# Reference documents

1. SUBSET-026 - System Requirement Specification – v X.X.X
2. SUBSET-076-5-2 - Test cases related to features – v X.X.X
3. SUBSET-076-6-3 - Test Sequences – v X.X.X
4. SUBSET-076-7 - Scope of the Test Specifications - v X.X.X
5. SUBSET-027 – FIS Juridical Recording - v X.X.X
6. ERA\_ERTMS\_040063 - Test Sequence Validation and Evaluation for SUBSET-076 –v X.X.X
7. SUBSET-094 - Functional Requirements for an on-board Reference Test Facility – v X.X.X
8. ETCS Driver Machine interface document v X.X.X
9. SUBSET-040 – Dimensioning and Engineering rules - v X.X.X
10. SUBSET-034 – Train Interface FIS - v X.X.X
11. ERA-GUI-05 – ERA Braking curves tool handbook – v X.X.X
12. SUBSET-153 – Exceptions for on-board reduced envelopes of ETCS system versions – v X.X.X

# Terms of reference and acronyms

|  |  |
| --- | --- |
| Acronym | Definition |
| BTM | Balise Transmission Module |
| DMI | Driver Machine Interface |
| ETCS | European Train Control System |
| JRU | Juridical Recording Unit |
| LTM | Loop Transmission Module |
| ODO | Odometry |
| RTM | Radio Transmission Module |
| TSI CCS | Technical Specification for Interoperability relating to the Control-Command and Signalling subsystems of the rail system in the European Union |

Table 1: Acronyms

# SW/HW Versions

# On-board equipment

* + 1. **On-board equipment/devices version**

The <Supplier Name> on-board equipment is composed of interfaces whose versions tested during the test campaign of the SUBSET-076-6-3 [[3]](#_Toc492905698) are described below.

|  |  |  |
| --- | --- | --- |
| Devices | SW | HW |
| EVC |  |  |
| DMI |  |  |
| JRU |  |  |
| BTM |  |  |
| RTM |  |  |
| LTM |  |  |
| ODO Adaptor |  |  |
| TIU Adaptor |  |  |
| CMD |  |  |

Table 2: On-board equipment versions

It should be noted that all these interfaces have been integrated with the laboratory test bench. Annex 2 (Section [A.2.2](#OLE_LINK9)) collects the tests performed and the results to ensure the correct functioning of all the on-board interfaces.

* + 1. **Optional interfaces**

The following table collects the options that have been implemented by the <Supplier Name> on-board equipment according to the optional interfaces defined in SUBSET-026 [[1]](#_Reference_documents).

|  |  |
| --- | --- |
| Optional interface | Comment |
| RIU |  |
| Euroloop |  |
| STM |  |
| Train Data acquired from ERTMS/ETCS external sources |  |
| Safe consist length information acquired from ERTMS/ETCS external sources |  |

Table 3: List of optional interfaces implemented

The detailed description of the functionalities affected is reported in Annex 1 (Section [A.1.4](#OLE_LINK4)) of the present document.

# Laboratory equipment

* + 1. **Test bench modules**

The versions of test bench modules defined in the SUBSET-094 [[7]](#_Reference_documents) under which the Test Sequences of the SUBSET-076-6-3 [[3]](#_Reference_documents) have been run are described below.

|  |  |  |
| --- | --- | --- |
| Modules | HW | SW |
| Laboratory Scenario Editor (LSE) |  |  |
| Laboratory Scenario Controller (LSC) |  |  |
| Train Interface Simulator (TIS) |  |  |
| Speed Sensor Simulator (SSS) |  |  |
| Cold Movement Sensor Simulator (CMS) |  |  |
| Train Data Simulator (TDS) |  |  |
| Train Motion Simulator (TMS) |  |  |
| Balise Telegram Simulator (BTS) |  |  |
| Loop Message Simulator (LMS) |  |  |
| Radio Message Simulator (RMS) |  |  |
| STM Messages Simulator (SMS) |  |  |
| ATO on-board Packets Simulator (ATOPS) |  |  |
| Laboratory Event Recorder (LER) |  |  |
| Radio Communication Simulator (RCS) |  |  |
| Juridical Recording Simulator (JRS) |  |  |
| Balise Communication Simulator (BCS) |  |  |
| Loop Communication Simulator (LCS) |  |  |
| STM Communication Simulator (SCS) |  |  |
| ATO on-board Communication Simulator (ATOCS) |  |  |
| DMI Interface Simulator (DIS) |  |  |
| Automatic Evaluation Tool (AET) |  |  |

Table 4: Test bench versions

As mentioned above, the test bench modules have been integrated with the on-board interfaces as described in Annex 2 (Section [A.2.2](#OLE_LINK9)).

* + 1. **Laboratory limitations**

The laboratory test bench has an identified number of limitations that do not allow testing the functionalities listed below:

* EX. “Data used by applications outside the ERTMS/ETCS system (Packet 44)”

These issues are detailed in Annex 2 (Section [A.2.1](#OLE_LINK8)).

# Test campaign

# General information

The aim of the document is to summarise the results of the SUBSET-076-6-3 [[3]](#_Reference_documents) campaign performed at *<Lab Name>* laboratory that proves the interoperability and functionality of *<Supplier Name>* on-board equipment against the SUBSET-026 [[1]](#_Reference_documents).

# Test sequence modifications

The issues observed during the execution of the SUBSET-076-6-3 [[3]](#_Reference_documents) caused the modification of some steps in order to be able to run all Test Sequences. This can be due to on-board limitations, laboratory limitations or test sequences errors. The changes in the Test Sequences are explained in Annex [A.1.5](#OLE_LINK5).

It shall be noted that all the Test Sequence modifications involve only the step affected while all other original functionalities tested in the SUBSET-076-6-3 [[3]](#_Reference_documents) are not altered.

# List of the test sequences non-executed

All sequences according to the SUBSET-076 have been executed with *<Supplier Name>* on-board equipment at *<Lab Name>* laboratory with the exception of the following ones:

|  |  |  |  |
| --- | --- | --- | --- |
| *Test Sequences non executed* | | | |
| SUBSET-076-6-3\_YYYYYYY\_ZZ\_vXXX.zip | *…* |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Table 5: Test Sequences non-executed

It must be noted that sequences executed fully or partly are all considered as executed with regards to the above table.

The tests sequences have been adapted to the supplier dynamics. Any other modification of a test sequence if done is explained in Annex [A.1.5](#OLE_LINK5).

In Annex 1 (Section [A.1.7](#OLE_LINK7)) the tables with the step results of all the SUBSET-076-6-3 Test Sequences [[3]](#_Reference_documents) according to the classification defined in the document [[6]](#_Reference_documents) are reported.

# Test sequence evaluation

The step results of the SUBSET-076-6-3 [[3]](#_Reference_documents) have been evaluated in line with the categories defined in the document “Test Sequence Validation and Evaluation for SS-076” [[6]](#_Reference_documents).

# Non-conformities of the on-board equipment with regards to SUBSET-026 and SUBSET-153

After the Test Sequence evaluation, some steps are classified as “non-passed”. The criterion followed to classify the step results is the defined in document [[6]](#_Reference_documents).

In the table below are listed the requirements of the specifications in which the behaviour of the on-board is not in line with the Test Sequence step description.

|  |  |
| --- | --- |
| *ID* | *Requirement* |
| *NC 1* |  |
| *NC 2* |  |
| *NC 3* |  |
| *…* |  |
|  |  |

Table 6: Non-conformities

Annex 1 (Section [A.1.2](#OLE_LINK2)) contains a detailed description of the requirements classified as “non-passed” and the conditions under which each requirement was tested in the test campaign.

It shall be remarked that all the results reported in this section and Annex 1 (Section [A.1.2](#OLE_LINK2)) are referred to the on-board version defined in section [4.1](#_On-board_equipment).

# Remarks from the expected Test Sequence results

* + 1. **Passed with comments**

In the steps where there is a range of values for ETCS variables different that the one used in the version implemented by the on-board of the SUBSET-076, an optional packet implemented by the supplier, a Change Request classified as error in the Agency CR Database or a not alignment of the DMI, JRU or Train Interface (outputs not harmonized by Ss-034) implementations by the supplier, it shall be classified as “passed with comments” according to the document [[6]](#_Reference_documents). These steps are reported in the Annex 1 (Section [A.1.3](#OLE_LINK3)).

It shall be remarked that all the results reported in this section and Annex 1 (Section [A.1.3](#OLE_LINK3)) are referred to the on-board version defined in section [4.1](#_On-board_equipment).

* + 1. **Optional interface**

As listed in section [4.1](#_On-board_equipment), the supplier has not implemented some optional interfaces defined in SUBSET-026 [[1]](#_Reference_documents).

These step results are classified as “Optional interface” according to document [[6]](#_Reference_documents) and reported in Annex 1 (Section [A.1.4](#OLE_LINK4)) of the present document.

The modifications performed in the original Test Sequence due to the on-board issues as mentioned above are described in Annex 1 (Section [A.1.5](#OLE_LINK5)).

It shall be noted that all the results reported in this section and Annex 1 (Section [A.1.4](#OLE_LINK4)) are referred to the on-board version defined in section [4.1](#_On-board_equipment).

* + 1. **Linked to previous error**

In the cases where the steps cannot be evaluated due to a previous error in the Test Sequence they shall be classified as “Linked to previous error” according to the document [[6]](#_Reference_documents). These results are linked to “non-passed” steps.

# Additional issues detected

This section contains particular behaviours observed and that are out of the scope of a SUBSET-076 test campaign and are not linked to any step of the Test Sequences. These events have been detected by the lab staff during the non-automatic analysis of the test sequences results (JRU, DMI, lab logs…).

Annex 1 (Section [A.1.6](#OLE_LINK6)) contains a detailed description of the issues detected during the test campaign.

# Log Files

# Test Sequence management

The log files are reported in the [Annex 3](#_Annex_3._Log). The Test Sequence identifiers and registers from all the available interfaces are defined below and were used afterwards for the evaluation of the Test Sequences:

* Identification number of the Test Sequence
* Version
* General description
* Test Comments
* LSE (Laboratory Scenario Editor)
* LER (Laboratory Event Recorder)
* JRU (Juridical Recording Unit)
* DMI media files

# Conclusions

# Test Sequence results

The aim of the test campaign is to prove the technical interoperability and functionality of an on-board equipment against the System Requirements Specifications. The Test Sequences of the SUBSET-076-6-3 [[3]](#_Reference_documents) have been executed at *<Lab Name>* laboratory and evaluated according to the criterion defined in document [[6]](#_Reference_documents).

The results of the analysis are that *<Supplier Name>* fulfils SUBSET-076 with the exception of <*number*> non-conformities that are listed in table 8.

The analysis of the testable requirements which are not in line with the expected result defined in the SUBSET-076-6-3 [[3]](#_Reference_documents) and the conditions under which they were tested are reported in Annex 1 (Section [A.1.2](#OLE_LINK2)).

# Annex 1. Tests results

**A.1.1 Test Sequence Evaluation summary**

The following table contains the list of results for all executed test sequences.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Test Sequence* | *Number of steps by category* | | | | | | |
| *PA* | *PC* | *OP* | *TS* | *NP* | *LP* | *NE* |
| <Sequence Name 1> |  |  |  |  |  |  |  |
| <Sequence Name 2> \* |  |  |  |  |  |  |  |
| <Sequence Name 3> |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

Table 7: Test sequences results

*Table Legend:*

*PA = passed; PC = passed with comments; OP = optional interface; TS = test sequence error; NP = non-passed; LP = linked to previous error; NE = not evaluated*

*Note:*

*Sequences identified with \* means that the sequence has been modified by the laboratory. See (Section* [*A.1.5*](#OLE_LINK5)*)*

**A.1.2 Non-conformities**

The following table contains the list of the testable requirements for which the on-board equipment behaviour is not in line with the expected result as defined in the SUBSET-076-6-3 [[3]](#_Reference_documents) and the conditions under which they were tested.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *ID* | *Requirement* | *TS* | *step* | *Problem description* |
| *NC1* |  |  |  |  |
| *NC2* |  |  |  |  |
| *NC3* |  |  |  |  |
| *NC4* |  |  |  |  |
| *NC5* |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Table 8: Non-conformities by Test Sequence

**A.1.3 Passed with comments steps**

The following table contains a list of “passed with comments” steps:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *ID* | *TS* | *step* | *Requirement* | *Description* |
| *PC 1* |  |  |  | *Use of a different range of values for ETCS variables to the ones used in Ss-076* |
| *PC 2* |  |  |  | *Optional packets implemented by the supplier* |
| *PC 3* |  |  |  | *Change Request classified as error in the ERA CR Database* |
| *PC 4* |  |  |  | *Not alignment of the DMI implementation by the supplier* |
| *PC 5* |  |  |  | *Not alignment of the JRU implementation by the supplier* |
| *PC 6* |  |  |  | *Not alignment of the TIU implementation by the supplier* |
| *…* |  |  |  |  |

Table 9: passed with comments steps

**A.1.4 On-board Optional Interfaces**

The following sequences were not fulfilled because an optional interface allowed by SUBSET-026 (RIU, Euroloop, STM, Train Data acquired from ERTMS/ETCS external sources, Safe consist length information acquired from ERTMS/ETCS external sources ) was not implemented in the on-board equipment:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *ID* | *TS* | *step* | *Optional interface* | *Description* |
| *O1* |  |  |  | *Provide individually or globally the sequences not fulfilled for optional interfaces* |
| *O2* |  |  |  |  |
| *O3* |  |  |  |  |
| *O4* |  |  |  |  |
| *O5* |  |  |  |  |
| *…* |  |  |  |  |
|  |  |  |  |  |

Table 10: On-board optional interfaces

**A.1.5 Modifications to the Test Sequences**

The following table contains the modifications done in the original test sequences and the reason for this modification. The modifications have been done due to on-board limitations, laboratory limitations or test sequences errors and especial attention has been put on ensuring that all the requirements covered by the original test sequence are still covered by the test sequences used during the test campaign.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *TS* | *Step* | *Modification* | *Reason* | *Test Case Coverage* |
|  |  |  |  | *Explain in this column how are you covering the requirements of the test cases deleted if you had done so while modifying the test sequence* |
|  |  |  |  |  |

Table 11: Modifications on test sequences

**A.1.6 Additional issues detected**

This section contains particular behaviours detected by the lab staff during the non-automatic analysis of the test sequences results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *ID* | *TS* | *step* | *Issue* | *Description* |
| *AI 1* |  |  |  |  |
| *AI 2* |  |  |  |  |
| *AI 3* |  |  |  |  |
| *AI 4* |  |  |  |  |
| *AI 5* |  |  |  |  |
| *…* |  |  |  |  |
|  |  |  |  |  |

Table 12: Additional issues detected

**A.1.7 Test sequences results**

*<Word files for each Test Sequence with the results>*

# Annex 2. Lab Description

**A.2.1 LAB limitations**

|  |  |  |  |
| --- | --- | --- | --- |
| *ID* | *LAB limitation* | *TCs affected* | *Associated Requirement* |
| *L 1* |  |  |  |
| *L 2* |  |  |  |
| *L 3* |  |  |  |

Table 13: Lab limitations

**A.2.2 Integration of the On-board equipment in the lab**

This Annex collects the tests performed and the results to ensure the correct functioning of all the on-board interfaces.

# Annex 3. Log Files

**END OF DOCUMENT**