

Väylänpito / Radanpito palvelut
Aki Härkönen

Säädösperusta / Regulation

Komission asetus (EU) 2016/919 Euroopan unionin rautatiejärjestelmän ohjaus-, hallinta- ja merkinanto-osajärjestelmiä koskevasta yhteentoimivuuden teknisestä eritelmästä / COMMISSION REGULATION (EU) 2016/919.

Korvaa / Replaces

- Lisäliite (Appendix 1) ATP-VR/RHK STM-N toiminnallisiin vaatimuseritelmiin - Appendix 1, ATP-VR/RHK ATM-N Functional requirements specification, 1.4.2016

- Lisäliite (Appendix 1.1) ATP-VR/RHK STM:N toiminnallisiin vaatimuseritelmiin - Appendix 1.1 ATP-VR/RHK STM-N functional requirements specification 16.9.2016

Voimassa / Valid

28.2.2020

Asiasanat / Key words

STM, JKV, FRS, ERTMS, ETCS

Junien kulunvalvontajärjestelmän JKV:n sovitustiedonsiirto-moduuli STM JKV, toiminnallisen FRS-vaatimuseritelmän lisäliite ADDENDUM 1.2

Tämä lisäliite 1.2 korvaa aiemmat lisäliitteet 1 ja 1.1. Tämä lisäliite 1.2 täydentää vaatimuseritelmäkokonaisuutta, joka sisältää: sovitustiedonsiirto-moduulin (STM-N) toiminnallisen vaatimuseritelmän (FRS, Functional Requirement Specification), yleisen teknisen vaatimuseritelmän (GRS, General Technical Requirements Specification) sekä luotettavuutta, käytettävyyttä, kunnossapidettävyyttä ja turvallisuutta (RAMS, Reliability, Availability, Maintainability and Safety) koskevan eritelmän. Eritelmät on laadittu englanniksi, koska se palvelee parhaiten eritelmien kohderyhmää, tuotteita valmistavaa teollisuutta.

This addendum replaces the previously published addendums 1 and 1.1. This addendum 1.2 supplements the totality of the requirements specifications for specific transmission module: STM-N FRS Functional Requirement Specification, the STM-N GRS General Technical Requirements Specification and the STM-N RAMS, Reliability, Availability, Maintainability and Safety. The specifications are written in English for better serving the target audience, the signalling equipment manufacturing industry.

Osastonjohtaja, tekniikka ja ympäristö

Minna Torkkeli

Rautatieteknisen yksikön päällikkö

Simo Toikkanen

Radanpidon palvelut -yksikön päällikkö

Aki Härkönen

LISÄTIETOJA
Aki Härkönen
Väylävirasto

Väylävirasto

PL 33

00521 HELSINKI

200228 STM JKV FRS ADDENDUM 1.2 VÄYLÄ-8582-060401-2019.docx

puh. 0295 34 3000

faksi 0295 34 3700

kirjaamo@vayla.fi

etunimi.sukunimi@vayla.fi

www.vayla.fi

ATP-VR/RHK STM-N
Functional Requirements Specification

FINNISH TRANSPORT INFRASTRUCTURE AGENCY (FTIA)

ATP-VR/RHK STM-N FUNCTIONAL REQUIREMENTS SPECIFICATION (STM JKV FRS)

STM JKV FRS

ADDENDUM 1.2

Document Modification History

Version	Modification	Valid from	Prepared	Checked	Approved
1.0	Final version	1.4.2016	T. Jukuri L. Valovuori A. Julku	M. Nummelin A. Härkönen J. Lehmusto	M. Noukka
1.1	Updated for DMI connection time (requirements G101 and G102)	1.9.2016	T. Jukuri A. Julku	M. Nummelin A. Härkönen J. Lehmusto	M. Noukka
1.2	Updated for DMI connection time from 3 to 5 seconds (req. G 102), added 2 notes for the requirements G 101 and G 102, and added a note (in ch. 3.3) to the functional requirement F 7039 regarding the service brake conflict supervision. Updated the re-connection attempts from at least 3 to at least 2 in the third note of chapter 3.4.2. Additionally some editorial changes.	28.2.2020	H. Nyström T. Jukuri	A. Härkönen S. Toikkanen	M. Torkkeli

TABLE OF CONTENTS

Definitions and abbreviations.....	3
1 INTRODUCTION	3
2 RULES FOR APPLICATION OF THE NEW FEATURES AND FUNCTIONS.....	4
3 ADDED FUNCTIONAL REQUIREMENTS.....	5
3.1 Data entry procedure optimization.....	5
3.2 Delta speed function re-design.....	7
3.3 Service brake requirements.....	8
3.4 DMI requirements	8
3.4.1 Re-establishment of interrupted DMI connection	8
3.4.2 Support for redundant DMI.....	8

Definitions and abbreviations

Note For definitions and abbreviations, refer to the [ATP-VR/RHK STM-N Functional Requirements Specification - PART 1 - System Introduction], Chapters 7 and 8.

Note For ETCS Glossary of Terms and Abbreviations refer to [SUBSET-023].

1 INTRODUCTION

Note This ADDENDUM 1.2 replaces ADDENDUM 1 and ADDENDUM 1.1. This ADDENDUM 1.2 therefore is the only valid version as a modification to the original FRS requirements.

Note This ADDENDUM is part of ATP-VR/RHK STM-N Functional Requirements Specification (FTA Jnro 544/068/2011) published by the Finnish Transport Agency.

Note The ADDENDUM 1.2 consists in general of optional features and functions related to the STM-N (NTC) Functional Requirements Specification (FRS) with the exception of the requirements G 101 and G 102, see chapter 3.3.1, which are mandatory requirements. The optional features and functions described in this document do not overrule any previous FRS requirement but they act as an alternative way to realize the STM-N product.

Note G 100 and F 8000 (starting from F 8001) series are new requirement groups compared to the original FRS.

Note In this ADDENDUM 1.2 the following notations have been used for the requirements and notes:

Bold text is new when compared to the original FRS requirement or note.

~~Strikethrough text~~ is deleted (not valid) when compared to the original FRS requirement or note.

2 RULES FOR APPLICATION OF THE NEW FEATURES AND FUNCTIONS

- Note The following notes describe how the new features and functions introduced in this ADDENDUM 1.2 to the FRS for STM-N shall be implemented.
- Note Data entry procedure optimization: In implementing the "Data entry procedure optimization" according to the optional requirements and notes listed in this ADDENDUM 1.2, all of the optional requirements and notes listed under data entry procedure optimization become mandatory to be implemented.
- Note Delta speed function re-design: In implementing the "Delta speed function re-design" according to the optional requirements and notes listed in this ADDENDUM 1.2, all the optional requirements and notes listed under Delta speed function re-design become mandatory to be implemented.
- Note DMI requirements: Requirements listed in ADDENDUM 1.2 under chapter 3.3.1 Re-establishment of interrupted DMI connection are mandatory requirements and need to be followed. Notes listed under 3.3.2 Support for redundant DMI are optional.

3 ADDED FUNCTIONAL REQUIREMENTS**3.1 Data entry procedure optimization**

Note This note is alternative to the note in FRS part 1, chapter 1.3 ATP-VR/RHK train data.

The train data used by the ATP onboard system includes:

- train number (JNO, used for registration only)
- brake type (JL)
- maximum permitted speed of the train (SNJ / V_{TRAIN})
- ~~- train weight (PAI)~~
- ~~- brake weight (JP, describing the braking capacity of the train)~~
- **brake weight percentage (JPP, describing the braking capacity of the train)**
- train length (PIT)
- percentages by which tilting trains can exceed the curve speed (KR% and OSA%)
- PT code (train specific)
- weather (track surface) condition data (KELI)

F 8001 This requirement is alternative to the FRS part 3 requirement F 2002.

The following ETCS train data shall be received and handled by the STM-N:

- a) ETCS max speed (Sth)
- b) ~~Train type~~
- c) **Train length**

F 8002 Requirement F 5017 is not applicable if the parameters for train and brake weights are replaced by brake weight percentage.

~~If the train weight value is altered also the brake weight shall be re-entered.~~

F 8003 This requirement is alternative to the FRS part 3 requirement F 5019.

Table 1/3. STM-N train data shall be entered according to following sequence:

Header of data item	Train data to be entered and the margin limits
JL	Brake type G, P, R or type of the train is DMU/EMU (see Note)
PIT	The length of the train in steps of 1m between 10 – 5000 by four digits. For DMU/EMU train types the number of train units shall be given instead of the length (see Note).
PAI	The weight of the train in steps of 1 ton; between, 10 – 9999 t
JP	Brake weight in steps of 1 ton, ranging between 1 – 9999 ton, and between 0,06 – 2,5 x train weight by four digits
JPP	Brake weight percentage in steps of 1 % between 6 - 250 %
PT	Code for special features of the train. Code is given by five digits, each of them 0 - 7 (see Note).
KELI	KELI 1 = 1 KELI 2 = 0,875 KELI 3 = 0,75

Note DMU/EMU train types include Sm1-2, Sm3, Sm4, Sm5, Sm6 and Dm12.

Note In the ATP-VR/RHK system train data input is initiated with "SYÖTTÖ" button.

Note ~~For the data item "PIT" and the DMU/EMU train types the number of train units should be given instead of the length. DMU/EMU train types include:~~

- ~~Sm 1-2: 1 – 9 units (53 m/unit)~~
- ~~Sm3: 1 – 9 units (160 m/unit)~~
- ~~Sm4: 1 – 9 units (55 m/unit)~~
- ~~Sm5: 1 – 9 units (76 m/unit)~~
- ~~Sm6: 1 – 9 units (186 m/unit)~~

~~Dm12: 1 – 9 units (26 m/unit)~~

~~Note Train units should be used for usability reasons for selection of train types. Safety aspects (i.e. possibility of erroneous and dangerous user input) should be considered when designing selection possibilities for different train types.~~

Note By pressing train data entry button PT entry can be skipped and a default value (e.g. default value = 00000) can be used. Possibility of unintended default value input should be considered when designing data entry procedure for train specific PT code.

~~Note ETCS train length data is used as default. If driver enters more restrictive value at start up, this is used.~~

Note Table 2/3. Other STM-N train data which is not entered:

Header of data item	Train data to be entered and the margin limits
JNO	ETCS train data
SNJ	ETCS train data
PIT	ETCS train data
KR %	Percentage of exceeding the v_{TRACK} in curves, ranging between 0 – 50 %, by two digits; Default value = 0 % (tilting train types and brake type R) (or by tilt information from ETCS)
OSA %	Percentage of reduction of KR %, ranging between 0 – 99, by two digits (0=0%, 1=1%, 2=2% etc.); Default value = 50 % (tilting train types and brake type R) (or by tilt information from ETCS, cf. KR %)

Note Brake type R trains include Sm3 and Sm6.

Note ETCS train number data (STM train data JNO) is used as default without driver data entry.

Note ETCS train speed data (STM train data SNJ) is used as default without driver data entry.

Note KR % and OSA % are applicable train data only when brake type R is used.

F 8004 This requirement is alternative to the FRS part 3 requirement F 5020.

According to the brake type (JL) the data entry sequence varies as follows:

- R, P, G -type: all the STM-N train data shall be entered (JL, ~~PIT, PAI, JP, JPP~~, PT, KELI)
- DMU/EMU train types: only JL, ~~PIT (number of units)~~, PT and KELI shall be entered

Note DMU/EMU train types include Sm1-2, Sm3, Sm4, Sm5, Sm6 and Dm12.

F 8005 This requirement is alternative to the FRS part 3 requirement F 5038.

a) Brake type R and $v_{TRAIN} > 120$ km/h; full service brake (pressure drop 170 kPa)

$$b_{STM} = \frac{7 \times \lambda + 100}{1000} \times k_v \times k_s + 0,01 \times g$$

λ = brake weight percentage (%) = **(JPP) entered by a driver** ~~100 x brake weight / train weight~~

g = track gradient (‰)

k_s = coefficient for rail surface condition (KELI) entered by a driver

KELI 1 -> $k_s = 1,00$

KELI 2 -> $k_s = 0,875$

KELI 3 -> $k_s = 0,75$

k_v = coefficient for velocity force dependency in disc brakes:

Table 23/3. Coefficient k_v

v_c (km/h)	k_v
0 - 150	1
151 - 160	0,989
161 - 170	0,978
171 - 180	0,967
181 - 190	0,956
191 - 200	0,945
201 - 210	0,934
211 - 220	0,923
221 - 230	0,912
231 - 240	0,901
241 - 250	0,890
251 - max	0,879

3.2 Delta speed function re-design

F 8006

This requirement is alternative to the FRS part 3 requirement F 2115.

Following speed limits shall be handled by the STM-N:

Table 11/3. Speed limits

No	Name	Meaning
1.	VTRAIN	Maximum permitted speed of the train (S_n, from ETCS train data). Maximum permitted speed of the train (S_n). Contains the most restrictive value of the two sub-categories ETCS and STM-N max speeds (from train data).
2.	VSTART	35 km/h speed limit after ATP start-up. Can be 0 km/h while waiting for train data.
3.	VSHUNT	35 km/h speed limit during shunting.
4.	VTARGET	Target speeds from signals and warning boards. Information given in advance for switch and speed restrictions as well as stop signals.
5.	VLINE VC1 VC2 etc.	Speed restrictions (speed limits), received from the most recent warning or speed board or signal. Categories: - Line speed, - C1 or C2, curve speed - PT, train-dependent speed (sub categories PT1-PT15) - etc.
6.	VRELEASE	Release speed at which the train can approach signal at Stop.
7.	VEND	Target speed when no release speed is used, otherwise release speed. For the stop aspect (also by level crossing and landslide) it is release speed.
8.	VERR	80 km/h or 60 km/h speed limit after balise error BF2-5.

3.3 Service brake requirements

Note This note is added to the FRS part 5, chapter 2.5 Service brake supervision, requirement F 7039:
It is highly recommended that a supervision of conflict between service brake level order and actual service brake level output is implemented in the STM-N.

3.4 DMI requirements

3.4.1 Re-establishment of interrupted DMI connection

G 101 If the connection to the (main) DMI is interrupted, the STM shall try to re-establish the connection. The STM shall make at least 2 attempts to re-establish the connection.

G 102 After a maximum of 5 seconds of supervised interrupt in connection, the STM shall go to failure state (FA).

Note The supervised interrupt in connection can be a configurable parameter as long as the configured time is 5 seconds or less.

Note The number of re-connection attempts to the DMI can be a configurable parameter as long as the configured amount is at least 2 attempts and can be executed within the chosen supervised connection interruption time.

3.4.2 Support for redundant DMI

Note To implement support for redundant DMI is optional for STM. If support for redundant DMI shall be implemented in the STM, the requirements in this chapter apply.

Note If the STM fails to establish a connection with the (main) DMI, the STM shall try to establish a connection with the redundant DMI, if it is available.

Note If the connection to the (main) DMI is interrupted, the STM shall try to re-establish the connection. If the STM fail to re-establish the connection to the (main) DMI after at least 2 attempts, the STM shall try to establish a connection with a redundant DMI if it is available.

Note If the STM fails to establish a connection both with the main and redundant DMI, the STM shall go to failure state (FA).

Asiakirja on sähköisesti allekirjoitettu

Asian VÄYLÄ/8582/06.04.01/2019 asiakirja

Lista allekirjoittajista

Allekirjoittaja

Todennus