

Making the railway system
work better for society.

OPINION

ERA/OPI/2016-2 amended

OF THE EUROPEAN UNION AGENCY FOR RAILWAYS

for

European Commission

regarding

a possible deficiency of the technical document

“Interfaces between CCS trackside and other subsystems”

[Opinion-Subject]

Disclaimer:

The present document is a non-legally binding opinion of the European Union Agency for Railways. It does not represent the view of other EU institutions and bodies, and is without prejudice to the decision-making processes foreseen by the applicable EU legislation. Furthermore, a binding interpretation of EU law is the sole competence of the Court of Justice of the European Union.

1. General Context

- 1.1. In the note referenced as MOVE B2/AA/ct Ares (2016) and dated on 29 June 2016 addressed to the Executive Director of European Union Agency for Railways (“the Agency”), the European Commission asked the Agency to provide an opinion regarding a possible deficiency of the technical document “Interfaces between CCS track-side and other subsystems”. This technical document is referenced “ERA/ERTMS/033281” (version 2.0) in the list of mandatory specifications in the Annex A (index 77) of the Control-command and Signalling TSI¹ (“2012 CCS TSI”) and in Appendix J-2 of the LOC&PAS TSI².
- 1.2. The possible deficiency was described in a letter from UNIFE, dated on 18 May 2016, addressed to the Head of ERTMS Unit of the Agency (see Annex 1 to this Opinion). The Agency forwarded the letter to the Commission, that issued the note mentioned above.
- 1.3. In their letter, UNIFE explained that, according to findings of Electromagnetic Compatibility experts, some evaluation parameters for the compatibility between axle counters and magnetic field emitted by vehicles are not fully correct. This discrepancy makes the evaluation method not effective.
- 1.4. The Agency was asked to provide an Opinion that constitutes an acceptable means of compliance concerning deficiencies in the TSIs, in accordance with Article 6(3) of Directive (EU) 2016/797³ (the “Interoperability Directive”). The Agency prepared and sent the European Commission its Opinion ERA/OPI/2016-2 on this issue.
- 1.5. The Opinion ERA/OPI/2016-2 was notified by the European Commission to the RISC members and some of its elements were put into question by one Member State, both during and after the RISC 77 meeting of 8/9 November 2016.
- 1.6. UNIFE proposed, in a subsequent letter, dated on 08 December 2016, addressed to the Head of ERTMS Unit of the Agency, a correction to their initial request of 18 May 2016 (see Annex 3 to this Opinion).
- 1.7. Following the discussions in the RISC and the UNIFE letter of 8 December 2016, the Agency re-examined the issue with the assistance with the Electromagnetic Compatibility Working Party, during its meeting of 15 December 2016, and decided to issue an amendment to Opinion ERA/OPI/2016-2.

2. Legal Background

- 2.1. Agency Regulation (EU) 2016/796 Article 19(1)(d) states that:
“The agency shall [...] issue opinions which constitute acceptable means of compliance concerning deficiencies in TSIs, in accordance with Article 6(4) of Directive (EU) 2016/797, and provide those opinions to the Commission”
- 2.2. 2012 CCS TSI and LOC&PAS TSI specify conditions that must be respected by axle counters and by vehicles, to ensure their compatibility, and corresponding evaluation parameters.

¹ Annex III to Commission Decision 2012/88/EU of 25 January 2012 on the technical specification for interoperability relating to the control-command and signalling subsystems (OJ L 51, 23.2.2012, p. 1).

² Annex to Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the ‘rolling stock — locomotives and passenger rolling stock’ subsystem of the rail system in the European Union (OJ L 356, 12.12.2014, p. 228).

³ Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system (Recast), OJ L 138, 26.5.2016, p. 44.

- 2.3. The evaluation parameters, which are the object of the correction requested by UNIFE, have been stated in the technical document ERA/ERTMS/033281 version 2.0. The CCS TSI set out as Annex to Commission Decision 2012/88/EU makes a mandatory reference to this document for the immunity characteristics of axle counters.
- 2.4. The version 3.0 of ERA/ERTMS/033281 confirms the same values. The CCS TSI set out as Annex to the Commission Regulation (EU) 2016/919⁴ ("2016 CCS TSI") makes a mandatory reference to this document for the immunity characteristics of axle counters.
- 2.5. The LOC&PAS TSI set out as Annex to Commission Regulation (EU) 1302/2014 in point 4.2.3.3.1.2 makes reference to the technical document ERA/ERTMS/033281 in relation to the limits for magnetic fields emitted by a vehicle.
- 2.6. The findings of the Electromagnetic Compatibility (EMC) experts show that the values of the evaluation parameters for the frequency band indicated as "Band 1" in table 2 (point 3.2.1.2) of ERA/ERTMS/033281 may lead to intolerability of short-term magnetic fields, making the evaluation not effective and constituting therefore a deficiency of the CCS TSI (both the 2012 CCS TSI and the 2016 CCS TSI) and the LOC&PAS TSI.

⁴ Commission Regulation (EU) 2016/919 of 27 May 2016 on the technical specification for interoperability relating to the 'control-command and signalling' subsystems of the rail system in the European Union (OJ L 158, 15.6.2016, p.1).

3. Analysis

- 3.1. The requested correction refers to the methodology to check compatibility between certain types of axle counters and vehicles, regarding magnetic fields emitted by the vehicles.
- 3.2. The correction concerns some existing products, i.e. the axle counters operating in the Band 1 specified in table 2 of ERA/ERTMS/033281.
- 3.3. The problem has been firstly discussed in the meetings on February 4th and May 19th of the Working Group on "Train Detection Compatibility", chaired by the Agency with the participation of experts of representative organisations of suppliers of axle counters and vehicles, Infrastructure Managers, Railway Undertaking and Notified Bodies.
- 3.4. The experts of the Working Group confirmed that:
 - 3.4.1. The correction is necessary, because measurements with the current values of the evaluation parameters imply an integration time too short, leading to overestimation of short transients;
 - 3.4.2. No negative impact is expected neither for vehicle suppliers nor for Infrastructure Managers.
- 3.5. The modified correction (see Annex 3), as proposed by UNIFE on December 8th, was analysed during the meeting on December 15th of the Working Group. The experts of the Working Group confirmed that:
 - 3.5.1. The modification is needed to remove an error in the originally proposed correction (dated on 18 May 2016).
 - 3.5.2. The resulting modified correction is still necessary (for the reasons stated in 3.4.1)
 - 3.5.3. The resulting modified correction does not negatively impact neither product suppliers, vehicle suppliers nor Infrastructure Managers.
- 3.6. Axle counters of this type are already in regular operation and are compatible with vehicles; however, new axle counters and vehicles of the same type could not pass the certification process, if the current evaluation parameters are applied for the evaluation of the emitted magnetic fields. The proposed correction does not affect existing products; it only avoids unjustified problems in the certification of new axle counters and vehicles.
- 3.7. Only axle counters operating in the Band 1 (frequency range from 41.2 to 44.8 kHz) are concerned; other frequency ranges are not affected by this problem and the corresponding correction.
- 3.8. During the check of ERA/ERTMS/033281 a minor typographical error was also detected:
 - 3.8.1. In the notes below table 2, "Figure 7" is erroneously indicated, while it should be "Figure 8".

4. The opinion

- 4.1. Taking into account the statements in the UNIFE letters and the results of the discussions in the Working Group on Train Detection Compatibility, the Agency proposes to modify the table 2 (point 3.2.1.2) and related notes of ERA/ERTMS/033281 according to Annex 2 to this Opinion. The graph for Band 1 in Figure 6 should be considered changed according to the values in the amended table 2.
- 4.2. These corrections should be applicable to version 3.0 of ERA/ERTMS/033281 and also to version 2.0 of the same document, for the cases where previous versions of TSIs may be applied.
- 4.3. This Opinion replaces the Opinion ERA/OPI/2016-2 and therefore the Opinion ERA/OPI/2016-2 cannot be used as acceptable means of compliance.
- 4.4. This Opinion should constitute acceptable means of compliance, pending the revision of the relevant TSIs.

Valenciennes, 13.01.2017



Josef DOPPELBAUER
Executive Director

ANNEX 1



Rue de la Loi 17
 1049 Bruxelles
 T +32 (0) 22 91 79 00
 F +32 (0) 22 91 79 01
www.unife.org

UNIFE office

Avenue Louise 921, 811
 B-1050 Brussels
 Belgium
 TEL: +32 (0) 2 291 79 00
 EMAIL: general@unife.org
www.unife.org

Board President
 Jacques Godey
 Philippe Chéreau
 President Board
 Christophe
 Laurent Tange

Board
 Niklas Grawinkel
 Andrew Doherty
 John van der Pijl
 Yvan Lejeune
 Christophers
 Aljo Schreier
 Stefano Saggese
 Dieter Wilschke

Bert de Waal
 UE: 610-1831000 76
 WAF
 DE: 6101-90-217

Name: Mr Pio Guido
 Head of the ERTMS Unit
 Address: European Railway Agency
 120 rue Marc Lefrancq
 City: F-59300 Valenciennes
 Country: France

Quai, 12th May 2016

Dear Sir,

I write you concerning the specification EN/ETCS/003281 v2.0 ("Interfaces between CCS track-side and other subsystems") to kindly request you for the modification of the article 3.2.1.3 ("Vehicle emission limits and evaluation parameters").

Based on the findings discussed by the ERM experts, emission limits and the related evaluation parameters stated in the table within the article 3.2.1.3 are not fully correct. Specifically, the request is regarding the limits for the frequency range between 41.8 and 44.2 MHz in Band I with the specified integration time of 9ms and 3 dB bandwidth of 40 Hz. The stated parameters for this frequency range may lead to the inoperability towards the short-term magnetic field (measured underneath rolling stock) and thus making this evaluation method not effective.

The requested change is as follows:





Current requirements: (p. 2.4):

Class 1	EN 50153	EN	EN 50153	EN	EN	EN 50153	EN 50153 (EN 50153-1)
Class 2	EN 50154	EN	EN 50154	EN	EN	EN 50154	EN 50154 (EN 50154-1)

Proposed modifications:

Class 1	EN 50153	EN	EN 50153	EN	EN	EN 50153	EN 50153 (EN 50153-1)
Class 2	EN 50154	EN	EN 50154	EN	EN	EN 50154	EN 50154 (EN 50154-1)

I would also like to mention that this modification is agreed by the UNIFE ERMC and signalling experts. UNIFE companies confirm, there is no negative influence on any existing product line products.

Thank you for considering this technical proposal and please don't hesitate to contact us for any question you may have.

I look forward to receiving your reply.

Yours sincerely,

Philippe C. Erwin
Director General

ANNEX 2

Correction of table 2 (point 3.2.1.2) of ERA/ERTMS/033281.

Table 2

Band	Frequency range defined by the centre frequency [kHz]	Emission limit X Axis [dB μ A/m] (RMS**)	Emission limit Y Axis [dB μ A/m] (RMS**)	Emission limit Z Axis [dB μ A/m] (RMS**)	Evaluation method	Filter order (butterworth) and 3 dB-bandwidth	Evaluation parameters
Out of band	10 to 27	Linear decay from 135 to 130	Linear decay from 135 to 130	Linear decay from 135 to 130	FFT		Record time 1 ms, Hanning window, 50% overlap, max hold
Band 1	27 to 41.2 and 44.8 to 52	93	93	98	BP	4 th order 300 Hz	20% overlap (3dB points) integration time: 1ms
Band 1	41.2 to 44.8	93	83*/90*	98	BP	4 th order 300 320 Hz	20% overlap (3dB points) integration time 1 ms
Band 1	41.8 to 44.2	-	85	-	BP	2nd order 40 Hz***	20% overlap (3dB points), integration time: 1ms
Out of band	52 to 234	130	130	130	FFT		Record time 1ms, Hanning window, 50% overlap, max hold
Band 2	234 to 287	120	99	100	BP	4 th order; 7500 Hz	20% overlap (3dB-points), integration time: 1.5 ms
Band 2	287 to 363	109	99	91	BP	4 th order; 7500 Hz	20% overlap (3dB-points), integration time 1.5 ms
Band 2	287 to 363	-	-	87	BP	4 th order; 4000 Hz	20% overlap (3dB-points), integration time: 1.5 ms
Out of band	363 to 740	125	125	125	FFT		record time 1ms, Hanning window, 50% overlap, max hold
Band 3	740 to 1026	106	85	101	BP	4 th order; 10 kHz	20% overlap (3dB-points), integration time: 1.5 ms
Band 3	1026 to 1250	119	113	113	BP	4 th order; 10 kHz	20% overlap (3dB-points), integration time 1.5 ms

* 90 dB μ A/m for emissions under the train, defined by the distance between the middle of the first and the last axle of the train + 0.5m on both sides, independently of the radius of the wheels. See Figure 7 8 below.

83 dB μ A/m for emissions measured before the first axle and after the last axle of the train has passed over the measurement sensor, see Figure 7 8 below.

** For in-band frequencies, the overlap for RMS calculations shall be at least 75%

FFT= Fast Fourier Transformation; BP= Band pass Filtering.

~~*** Prefiltering with a bandpass filter of 4th order and a 3 dB bandwidth of 1000 Hz is possible~~

ANNEX 3

Proposal of UNIFE for a correction of the modification of table 2 (point 3.2.1.2) of ERA/ERTMS/033281 (see Annex 2)



UNIFE
 Director General
 +32 2 543 70 67
 +32 2 492 72 81 09
 philippe.moonen@unife.org

UNIFE belgi
 Avenue Louise 211, B-1
 B-1050 Brussels
 Belgium
 TEL: +32 2 526 11 64
 EMAIL: general@unife.org
 WWW.UNIFE.ORG

Name: Mr Pio Guido
 Head of the ERTMS Unit
 Address: European Union Agency for Railways
 Agence de l'Union européenne pour les chemins de fer
 120, Rue Marc Lefrancq 120 Rue Marc Lefrancq
 City: F-59300 Valenciennes
 Country: France

Brussels, 08 December 2016

Dear Pio,

Linked to the UNIFE letter addressed to ERA, dated on 18th May 2016, on the proposed changes regarding the ERA/ERTMS/033261 v2.0 specification, article 3.2.1.7, UNIFE would like to correct the proposed modification as follows:

Instead of the originally proposed modification:

Band 1	41,2 to 44,8	93	83°80"	88	EP	4 th order 300-320 Hz	20% overlap (3dB points) integration time: 4.2ms
Band 1	41,8 to 44,2	-	85	-	BP	2 nd order 40 Hz	20% overlap (3dB points) integration time: 1ms

UNIFE proposes to apply the following modification (no change for the integration time in Band 1, the area 41,2 to 44,8 MHz):

Band 1	41,2 to 44,8	93	83°80"	88	EP	4 th order 300-320 Hz	20% overlap (3dB points) integration time: 1ms
Band 1	41,8 to 44,2	-	85	-	BP	2 nd order 40 Hz	20% overlap (3dB points) integration time: 1ms

We are sorry for providing you with the UNIFE proposal containing a mistake and for all the negative consequences this may have caused.





Current requirements: (p 2.0):

EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153
EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153

Proposed modifications:

EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153
EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153	EN 50153

I would also like to mention that this modification is agreed by the UNIFE EMC and signalling experts. UNIFE companies confirm, there is no negative influence on any existing product they produce.

Thank you for considering this technical proposal and please don't hesitate to contact us for any questions you may have.

I look forward to receiving your reply.

Yours sincerely,

Philippe Gelin
 Director General

ANNEX 2

Correction of table 2 (point 3.2.1.2) of ERA/ERTMS/033281.

Table 2

Band	Frequency range defined by the centre frequency [kHz]	Emission limit X Axis [dB μ A/m] (RMS**)	Emission limit Y Axis [dB μ A/m] (RMS**)	Emission limit Z Axis [dB μ A/m] (RMS**)	Evaluation method	Filter order (butterworth) and 3 dB-bandwidth	Evaluation parameters
Out of band	10 to 27	Linear decay from 135 to 130	Linear decay from 135 to 130	Linear decay from 135 to 130	FFT		Record time 1 ms, Hanning window, 50% overlap, max hold
Band 1	27 to 41.2 and 44.8 to 52	93	93	98	BP	4 th order 300 Hz	20% overlap (3dB points) integration time: 1ms
Band 1	41.2 to 44.8	93	83*/90*	98	BP	4 th order 300 320 Hz	20% overlap (3dB points) integration time 1 ms
Band 1	41.8 to 44.2	—	85	—	BP	2nd order 40 Hz***	20% overlap (3dB points), integration time: 1ms
Out of band	52 to 234	130	130	130	FFT		Record time 1ms, Hanning window, 50% overlap, max hold
Band 2	234 to 287	120	99	100	BP	4 th order; 7500 Hz	20% overlap (3dB-points), integration time: 1.5 ms
Band 2	287 to 363	109	99	91	BP	4 th order; 7500 Hz	20% overlap (3dB-points), integration time 1.5 ms
Band 2	287 to 363	--	--	87	BP	4 th order; 4000 Hz	20% overlap (3dB-points), integration time: 1.5 ms
Out of band	363 to 740	125	125	125	FFT		record time 1ms, Hanning window, 50% overlap, max hold
Band 3	740 to 1026	106	85	101	BP	4 th order; 10 kHz	20% overlap (3dB-points), integration time: 1.5 ms
Band 3	1026 to 1250	119	113	113	BP	4 th order; 10 kHz	20% overlap (3dB-points), integration time 1.5 ms

* 90 dB μ A/m for emissions under the train, defined by the distance between the middle of the first and the last axle of the train + 0.5m on both sides, independently of the radius of the wheels. See Figure 7 8 below.

83 dB μ A/m for emissions measured before the first axle and after the last axle of the train has passed over the measurement sensor, see Figure 7.8 below.

** For in-band frequencies, the overlap for RMS calculations shall be at least 75%

FFT= Fast Fourier Transformation; BP= Band pass Filtering.

~~*** Prefiltering with a bandpass filter of 4th order and a 3 dB bandwidth of 1000 Hz is possible~~

ANNEX 3

Proposal of UNIFE for a correction of the modification of table 2 (point 3.2.1.2) of ERA/ERTMS/033281 (see Annex 2)



UNIFE
 Dr Pierre Gendrel
 Tel: +32 2 543 70 82
 Fax: +32 2492 70 83 09
 Email: pi@unife.org

UNIFE vial
 Avenue Louise 221-511
 B-1050 Brussels
 Belgium
 Tel: +32 2 737 21 11
 Email: general@unife.org
 WWW.UNIFE.ORG

Name: Mr Pio Guido
 Head of the ERTMS Unit
 Address: European Union Agency for Railways
 Agence de l'Union européenne pour les chemins de fer
 120, Rue Marc Lefrancq 120 rue Marc Lefrancq
 City: F-59300 Valenciennes
 Country: France

Brussels, 08 December 2016

Dear Pio,

Linked to the UNIFE letter addressed to ERA, dated on 18th May 2016, on the proposed changes regarding the ERA/ERTMS/033281 v2 D specification, article 3.2.1.2, UNIFE would like to correct the proposed modification as follows.

Instead of the originally proposed modification:

Band 1	41,2 to 44,8	93	83190*	93	BP	4 th order 300-320 Hz	20% overlap (308 points) integration time: 4 ms
Band 1	41,8 to 44,2	-	85	-	BP	2 nd order 40 Hz	20% overlap (308 points) integration time: 1ms

UNIFE proposes to apply the following modification (no change for the integration time in Band 1, the area 41,2 to 44,8 kHz).

Band 1	41,2 to 44,8	93	83190*	98	BP	4 th order 300-320 Hz	20% overlap (308 points) integration time: 1 ms
Band 1	41,8 to 44,2	-	85	-	BP	2 nd order 40 Hz	20% overlap (308 points) integration time: 1ms

We are sorry for providing you with the UNIFE proposal containing a mistake and for all the negative consequences this may have caused

