EUROPEAN
COMMISSION

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ANNEXES 1 to 2

ANNEXES

to the

COMMISSION IMPLEMENTING REGULATION (EU) …/...

amending Regulation (EU) No 1301/2014 and Regulation (EU) No 1302/2014 as regards provisions on energy measuring system and data collecting system

ANNEXES

Annex I

The Annex to Regulation (EU) 1301/2014 is amended as follows:

(1) point (3) of point 2.1 is replaced by the following:

'In accordance with Annex II, Section 2.2 of Directive 2008/57/EC, the trackside of the electricity consumption measuring system, referred to in this TSI as on-ground energy data collecting system, is set out in point 4.2.17 of this TSI.';

(2) the title of point 4.2.5 replaced by the following:

'Current at standstill (DC systems only)';

(3) the first paragraph of point 4.2.13 is replaced by the following:

'The overhead contact line shall be designed for a minimum of two pantographs operating adjacently. The design spacing of the two adjacent pantograph heads, centre line to centre line, shall be equal or lower than values set out in one column 'A', 'B', or 'C' selected from Table 4.2.13:';

(4) in point 4.2.13, table 4.2.13, first row, the word "Minimum" in the titles of columns is deleted;

(5) point 4.2.17 is replaced by the following:

'(1) Point 4.2.8.2.8 of LOC & PAS TSI contains the requirements for on-board Energy Measurement Systems (EMS) intended to produce and transmit the Compiled Energy Billing Data (CEBD) to an on-ground energy data collecting system.

(2) The on-ground energy data collecting system (DCS) shall receive, store and export CEBD without corrupting it, in accordance with the requirements quoted in clause 4.12 of EN 50463-3:2017.

(3) The on-ground energy DCS shall support all the data exchange requirements as defined in point 4.2.8.2.8 of the LOC&PAS TSI and requirements set out in clauses 4.3.6.1 and 4.3.7.1 of EN 50463-4:2017.';

(6) the title of point 5.2.1.6 is replaced by the following:

'Current at standstill (DC systems only)';

(7) the title of point 6.1.4.2 is replaced by the following:

'Assessment of current at standstill (DC systems only)';

(8) point (c) of 6.1.5 is replaced by the following:

'(c) continuous current rating;';

(9) point 7.2.4 is replaced by the following:

'Within 2 years after entering into force this Regulation, Member States shall ensure that an on-ground energy data collecting system capable to exchange compiled energy billing data will be implemented.';

(10) point (d) of point 7.3.1 is replaced by the following:

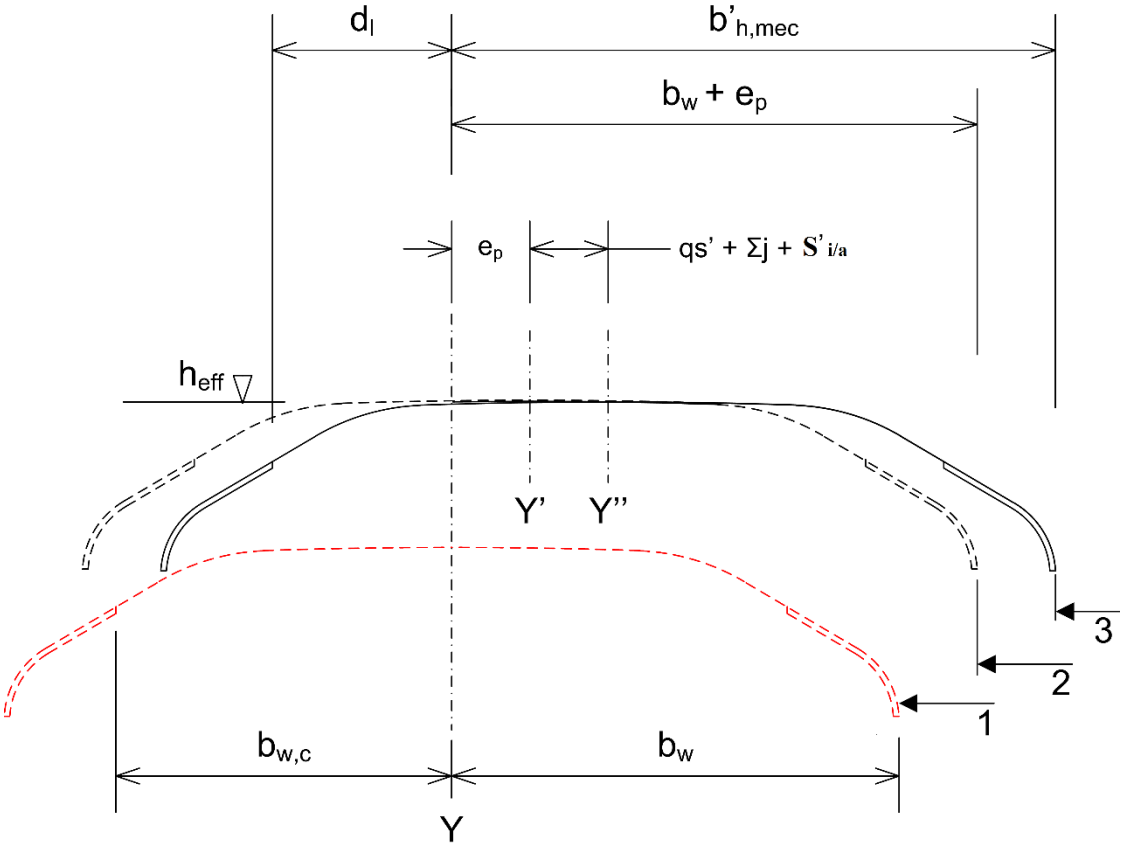
'An existing subsystem may allow the circulation of TSI-compliant vehicles whilst meeting the essential requirements of Directive 2008/57/EC. The procedure to be

used for the demonstration of the level of compliance with the basic parameters of the TSI shall be in accordance with Commission Recommendation 2014/881/EU ';

(11) point 7.3.4 is replaced by the following:

'The procedure to be used for the demonstration of the level of compliance of existing lines with the basic parameters of this TSI shall be in accordance with Commission Recommendation 2014/881/EU.';

(12) in Appendix D, Figure D.1 Pantograph mechanical gauges is replaced by the following figure:



(13) in Table E.1 of Appendix E, rows 9 and 10 are added:

9	EN 50463-3	Railway application - Energy measurement on board trains - Part 3: Data handling	2017	On-ground energy data collecting system (4.2.17)
10	EN 50463-4	Railway application - Energy measurement on board trains - Part 4: Communication	2017	On-ground energy data collecting system (4.2.17)

(14) the text of Appendix F is replaced by 'Intentionally deleted';

(15) in Table G.1 Glossary of Appendix G, the row "Neutral section insulator" is deleted;

Annex II

The Annex to Regulation (EU) 1302/2014 is amended as follows:

(1) in chapter 4 ‘Characteristics of the rolling stock subsystem’, clause 4.2.8.2.8 ‘On-board energy measurement system’ is replaced by the following clause:

‘4.2.8.2.8 On-board energy measurement system

4.2.8.2.8.1 General

(1) The on-board energy measurement system (EMS) is the system for measurement of all active and reactive electric energy taken from or returned (during regenerative braking) to the overhead contact line (OCL) by the electric unit.

(2) The EMS shall include at least the following functions: Energy measurement function (EMF) as set out in clause 4.2.8.2.8.2, data handling system (DHS) as set out in clause 4.2.8.2.8.3.

(3) A suitable communication system will send the measured data to an on-ground data collecting system (DCS). The interface protocols and transferred data format between EMS and DCS shall fulfil the requirements set out in point 4.2.8.2.8.4.

(4) This system is suitable for billing purposes; the data defined in point 4.2.8.2.8.3 (4) provided by this system shall be accepted for billing in all Member States.

(5) The EMS rated current and voltage shall be matched to the electric unit rated current and voltage; it shall continue to function correctly when changing between several traction energy supply systems.

(6) Data stored in the EMS shall be protected against loss of the power supply and the EMS shall be protected from non-authorised access.

(7) An on-board location function providing location data originated from an external source to the DHS shall be provided in networks where such function is necessary for billing purposes only. In any case, the EMS system shall be able to accommodate a compatible location function. If the location function is provided, it shall fulfil the requirements set out in specification referenced in Appendix J-1, index 116.

(8) The fitment of an EMS, its on-board location function, the description of on-board to ground communication and the metrological control including the accuracy class of the EMF shall be recorded in the technical documentation described in clause 4.2.12.2 of this TSI.

(9) The maintenance documentation described in clause 4.2.12.3 of this TSI shall include any periodic verification procedure to ensure the required accuracy level of the EMS during its lifetime.

4.2.8.2.8.2 Energy measurement function (EMF)

(1) The EMF shall ensure the measurement of the voltage and current, calculation of the energy and production of energy data.

(2) The measured energy values produced by EMF shall have a time reference period of 5 minutes defined by the Universal Time Coordinated (UTC) clock time at the end of each time reference period; originating from the time stamp 00:00:00; It is permitted to use a shorter measuring period if the data can be aggregated on-board into 5 minutes time reference period.

(3) The accuracy of EMF for active energy measurement shall comply with clauses 4.2.3.1 to 4.2.3.4 of the specification referenced in Appendix J-1, index 117.

(4) Each device containing one or more functions of EMF shall indicate: metrological control, and its accuracy class, according to the class designations specified in the specification referenced in clauses 4.3.3.4, 4.3.4.3 and 4.4.4.2 of the specification referenced in Appendix J-1, index 117.

(5) The conformity assessment of the accuracy is set out in clause 6.2.3.19b.

4.2.8.2.8.3 Data handling system (DHS)

(1) The DHS shall ensure the production of compiled energy billing data sets for energy billing purposes, by merging data from the EMF with time data and, when required, geographical position, and storing it ready to be sent to an on-ground data collecting system (DCS) by a communication system.

(2) The DHS shall compile the data without corrupting them and shall incorporate data storage with a memory capacity sufficient to store the compiled data of at least 60 days continuous operation. The time reference used shall be the same as in the EMF.

(3) The DHS shall have a capability to be interrogated locally on-board for audit and data recovery purposes.

(4) The DHS shall produce compiled energy billing data sets, (CEBD), by merging the following data for each time reference period:

- unique EMS consumption point identification (CPID) as defined in the specification referenced in Appendix J-1, index 118.
- end time of each period, defined as year, month, day, hour, minute and second;
- location data at the end of each period;
- consumed/regenerated active and reactive (if appropriate) energy in each period, in units of Watthour (active energy) and var-hour (reactive energy) or their decimal-multiples.

(5) The conformity assessment of compilation and handling of data produced by DHS is set out in clause 6.2.3.19b.

4.2.8.2.8.4 Interface protocols and transferred data format between EMS and DCS

(1) The data exchange between EMS and DCS shall fulfil the following requirements:

- The application services (service layer) of the EMS shall comply with clause 4.3.3.1 of the specification referenced in Appendix J-1, index 119.

– User access rights for these application services shall comply with clause 4.3.3.3 of the specification referenced in Appendix J-1, index 119.

– The structure (data layer) for these application services shall comply with the XML schema as defined in clause 4.3.4 of the specification referenced in Appendix J-1, index 119.

– The message mechanism (message layer) for supporting these application services shall comply with the methods and the XML schema in clause 4.3.5 of the specification referenced in Appendix J-1, index 119.

– The application protocols for supporting the message mechanism shall comply with clause 4.3.6 of the specification referenced in Appendix J-1, index 119.

– The EMS shall use at least one of the communication architectures in clause 4.3.7 of the specification referenced in Appendix J-1, index 119.";

(2) in chapter 4 'Characteristics of the rolling stock subsystem', the point 4.2.12.2 (14) is replaced by the following:

'(14) Fitment of an on-board energy measurement system, and of its on-board location function (optional), as required in clause 4.2.8.2.8; Description of on-board to ground communication and the metrological control including the accuracy classes of the voltage measurement, current measurement and energy calculation functions';

(3) in chapter 6 'Assessment of conformity or suitability for use and 'EC' verification', the following clause is added below the clause 6.2.3.19:

'6.2.3.19b On-board energy measurement system (clause 4.2.8.2.8)

(1) Energy measurement function (EMF)

The accuracy of the each device containing one or more functions of EMF shall be assessed by testing each function, under reference conditions, using the relevant method as described in clauses 5.4.3.4.1, 5.4.3.4.2 and 5.4.4.3.1 of the specification referenced in Appendix J-1, index 117. The input quantity and power factor range when testing shall correspond to the values set out in Table 3 of the specification referenced in Appendix J-1, index 117.

The effects of temperature on accuracy of the each device containing one or more functions of EMF shall be assessed by testing each function, under reference conditions (except for temperature), using the relevant method as described in clauses 5.4.3.4.3.1, and 5.4.4.3.2.1 of the specification referenced in Appendix J-1, index 117.

The mean temperature coefficient of each device containing one or more functions of EMF shall be assessed by testing each function, under reference conditions (except for temperature), using the relevant method as described in clauses 5.4.3.4.3.2 and 5.4.4.3.2.2 of the specification referenced in Appendix J-1, index 120.

(2) Data handling system (DHS)

The compiling and handling of data within the DHS shall be assessed by testing using the method as described in the specification referenced in Appendix J-1, index 121.

(3) On-board energy measurement system (EMS)

The EMS shall be assessed by testing as described in the specification referenced in the specification referenced in Appendix J-1, index 122.';

(4) in the list 'APPENDICES' following Chapter 7, the text 'Appendix D: Energy meter' is replaced by 'Appendix D: Intentionally deleted';

(5) the text of Appendix D is replaced by 'Intentionally deleted';

(6) in the second table of appendix I 'Aspects for which the technical specification is not available (open points)', the following row is deleted:

On-board energy measurement system	4.2.8.2.8 and Appendix D	On-board to ground communication: specification related to interface protocols and transferred data format	Description of on-board to ground communication shall be provided in the technical documentation. The standard series EN 61375-2-6 should be used.

(7) in appendix J-1, 'Standards or normative documents', the indexes 103, 104 and 105 are replaced by the indexes below:

103	NOT USED
104	NOT USED
105	NOT USED

(8) in appendix J-1, 'Standards or normative documents', the indexes below are added:

106	NOT USED
107	NOT USED
108	NOT USED
109	NOT USED
110	NOT USED
111	NOT USED
112	NOT USED
113	NOT USED
114	NOT USED

115	NOT USED			
116	On-board location function- Requirements	4.2.8.2.8.1	EN 50463-3:2017	4.4
117	Accuracy of energy measurement function for active energy measurement: Requirements Class designations Assessment methodology	4.2.8.2.8.2 6.2.3.19b	EN 50463-2:2017	4.2.3.1 and 4.2.3.4 4.3.3.4, 4.3.4.3 and 4.4.4.2 5.4.3.4.1, 5.4.3.4.2, 5.4.4.3.1, Table 3, 5.4.3.4.3.1 and 5.4.4.3.2.1
118	Energy measurement function: consumption point identification - Definition	4.2.8.2.8.3	EN 50463-1:2017	4.2.5.2
119	Interface protocols between on-board energy measurement system (EMS) and on-ground data collection system (DCS) - Requirements	4.2.8.2.8.4	EN 50463-4:2017	4.3.3.1, 4.3.3.3, 4.3.4, 4.3.5, 4.3.6 and 4.3.7
120	Energy measurement function: mean temperature coefficient of each device - Assessment methodology	6.2.3.19b	EN 50463-2:2017	5.4.3.4.3.2 and 5.4.4.3.2.2

121	The compiling and handling of data within the data handing system-Assessment methodology	6.2.3.19b	EN 50463-3:2017	5.4.8.3, 5.4.8.5 and 5.4.8.6
122	On- board energy measurement system-Tests	6.2.3.19b	EN 50463-5:2017	5.3.3 and 5.5.4