CONFORMITY ASSESSMENT GUIDELINES

Version 1.0

GENERAL CONFORMITY ASSESSMENT GUIDELINES

1. NORMS AND SPECIFICATIONS

1.1	Which technical specifications are applicable to railway energy metering onboard trains?	TSI LOC & PAS specifies the requirements for on-board metering equipment. TSI Energy specifies the requirement for member states to have an on-ground energy data collecting system (DCS). EN 50463 Part 1 to 5 The TSI refers to some clauses of this standard. These clauses are mandatory. The other clauses of EN 50463 are not mandatory.
1.2	What is the difference between TSI LOC&PAS and EN 50643?	**TSI LOC&PAS** - TSI LOC&PAS (EU) 1302/2014 describes the mandatory requirements for on-board Energy Measuring Systems (EMS) in order to ensure interoperability. - It refers to clauses of EN 50463-series. - An EMS is no interoperable by itself, so it is not possible to make an assessment on an EMS not installed on a vehicle. The assessment of conformity has to be done at the vehicle level (subsystem level). **EN 50643** The EN 50463 norm describes the specific requirements for on-board Energy Measuring Systems (EMS) EN 50463-1: Describes system level requirements, common device requirements. EN 50463-2: Decribes singel function requirements of the Energy Measurement function. These are: -Voltage Measurement Function (VMF) -Current Measurement Function (CMF) -Energy Calculation Function (ECF) EN 50463-3: Describes data handling, including: -Data Handling System (DHS) and Data Collection System (DCS) EN 50463-4: Describes communication EN 50463-5: Describes conformity assessment The EN 50463 offers a systematic and detailed assessment based on quantitative requirements. The EN 50463 is an harmonised standard. Therefore, assessing conformity towards EN 50463 provides a presumption of conformity with the essential requirements of relevant clauses in the TSIs.

1.3	Closing of the open point	The LOC&PAS TSI includes requirements for EMS. The ENE TSI includes requirements for DCS. Any interface between TSIs shall be uniquely defined. As they were not available in 2014, this was regarded as an open point between two TSIs. An update of EN 50463-series has been approved in March 2017 and includes the requirementes for data exchange between EMS and DCS. New versions of LOC&PAS TSI and ENE TSI are expected in 2018 and will refer to clauses in this new EN 50463-series.

2. LEGAL AND REGULATORY REQUIREMENTS

2.1	Who may define the regulatory and legal requirements for railway energy metering and billing?	The EU Commission, through: - The Interoperability Directive and the Commission Regulations introducing the TSI's, defines the legal framework for railway energy metering. - The Railway Market Directive, defines the services to be offered to Train Operators. - The Energy Market Directive and connecting regulation defines the areas where the network codes will be developed. *Network codes are sets of rules which apply to one or more parts of the energy sector.*
2.2	What other requirements may need to be taken into account?	- Technical requirements of the Infrastructure Manager as defined in the Network Statement may need to be taken into account. Such requirements shall not contradict the TSIs and shall not hamper the use of interoperable EMS. - Technical requirements of the Energy Network Provider should also be considered.
2.3	What entities might verify the legal framework?	- The National Transport Regulator - The National Safety Authority - The National Energy Market Authority/Regulator
2.4	What is required to be available on ground?	The commision regulation 1301/2014 introducing the actual TSI ENE requires each country to have an on-ground Data Collecting System (DCS) able to collect the Compiled Energy Billing Data (CEBD) coming from the EMS in accordance with the new protocol defined in EN 50463-4:2017. Older EMS can still use proprietary protocols for the transmission of CEBD to a DCS of the EMS supplier. The same commission regulation also requests each country to have a Settlement System able to receive CEBD from the DCS, exchange the CEBD with other settlement systems, validate the CEBD and allocate the consumption data to the correct parties. This shall be done by taking into account the relevant legislation concerning the energy market.

3. DETERMINING ASSESSMENT REQUIREMENTS FOR INSTALLED EMS

3.1	For EMS installed after 2011 on TSI compliant rolling stock:	The TSI LOC&PAS assessment is required. The EMS is considered a part of the EC (European Conformity) verification activity for the rolling stock subsystem.
3.2	When the EMS is EN-compliant, but the EMS is older than 2011 (or installed on a non-TSI compliant rolling stock):	Here, it is recommended to request an assessment in accordance with the EN 50463 by a product certification body (which does not necessary have to be a Notified Body). A statement of conformity with the specific norm can be issued.
3.3	When the EMS is not EN-compliant:	In this case, please check the national regulation. It is recommended to request a product certification in accordance to EN 50463 indicating also the differences compared to the requirements. This facilitates the cross-acceptance of data coming from the EMS in different countries.

CONFORMITY ASSESSMENT

Activity to determine, directly or indirectly, that a process, product, or service meets relevant technical standards and fulfills relevant requirements. Assessment can include inspection and examination of a product, its design and manufacture.

4. PRODUCT VERIFICATION OF EMS IN ACCORDANCE WITH EN 50463

4.1	Which stages are involved in the conformity assessment to EN 50463?	The conformity assessment is undertaken in the following key stages: 1. device level (newly manufactured devices); 2. EMS level (integration of the different parts of an EMS); 3. Vehicle level (installation of the EMS on-board of a vehicle); 4. EMS re-verification and device component replacement.
4.2	Which methods are used in the conformity assessment to EN 50463?	Which methods are used in the conformity assessment to EN50463? a) device design review (device level): EN 50463-2, -3 and -4 b) device type test (device level): EN 50463-2, -3 and -4 c) device routine test (device level): EN 50463-2, -3 and -4 d) EMS integration design review (EMS level): EN 50463-5 e) EMS integration type test (EMS level): EN 50463-5 f) EMS installation design review (vehicle level): EN 50463-5 g) EMS installation type test (vehicle level): EN 50463-5 h) EMS installation routine test (vehicle level): EN 50463-5 i) EMS periodic re-verification: EN 50463-2 and -5 j) EMS device component replacement EMS re-verification
4.3	Why should a conformity assessment to EN 50463 be carried out by an independent body?	Energy meters on trains are not within the scope of the regulations for electricity meters for private and industrial applications. Therefore, they do not need to be calibrated by the governement measurement office. The conformity assessment to the EN 50463 by an independent test body provides an objective confirmation that the energy billing data delivered by the EMS meets an acceptable quality level (in terms of completeness, correctness and accuracy). As the EN 50463 is a harmonised standard, EMS-suppliers may perform type test and routine tests on a device level. The laboratory of the EMS supplier needs to have an accreditation in accordance with the EN 17025 in order to perform metrological tests. The Notified Bodies have agreed on an alternative procedure in order to be able to assess tests executed by labs not having such an EN 17025-accreditation.

4. PRODUCT VERIFICATION OF EMS IN ACCORDANCE WITH THE EN 50463 (cont.)

4.4	What are the different devices which form part of the EMS?	EN 50463 considers the following functions as part of the EMS: a) voltage measurement function (VMF): EN 50463-2 b) current measurement function (CMF): EN 50463-2 c) energy calculation function (ECF): EN 50463-2 d) data handling system (DHS): EN 50463-3 Functions can be split over different devices. Functions or parts of functions can be grouped in devices.
4.5	Can existing transducers already installed in the vehicles be re-used?	This depends on: a) the specific requirement in the country b) the specifications of the existing transducers (also in relation to the rated values for the applicable traction systems on the vehicle) c) the conformity certificates and test reports available for these transducers, which will be accepted as proof of conformity by the NoBo / inspection authority. A product certification body might be able to redefine the accuracy class in accordance with EN 50463-2 for components previously tested in accordance with e.g. EN 60044-1 (current transformers). As accuracy requirements are extended in EN 50463-2, it is likely that a 0.5 class becomes a 0.75R class.
4.6	What happens if the EMS does not comply 100% with all of the EN 50463 requirements?	Only the clauses of EN 50463 refered to by TSI are mandatory on TSI-compliant rolling stock. But it should also be possible to use data coming from older EMS or installed on older rolling stock. Data coming from EMS not fully compliant to EN 50463 might be used for billing purposes. Assessment should define explicitly the parts of non-compliance (e.g. sensors that aren't sufficient accurate for small currents). Assessment should also make distinction between requirements from TSI (crucial for interoperability) and other requirements.
4.7	Who will perform the routine tests?	An independent body should only be responsible for design review and type tests. The device manufacturers will in most cases perform the device routine tests, incl. single components. The train builder or the Train Operator installing the EMS on an individual vehicle will perform the installation routine test.

4.8	Can a single assessment cover a whole fleet?	An independent body will perform the design review and type tests for each EMS of a specific vehicle type, when installed on-board of a representative of that traction unit type. So a new EMS installation type test shall be executed for each traction unit type. It is possible that a specific EMS equipment type can be used on different traction untit types. Then the EMS integration type test doesn't have to be repeated. If the EMS components and the installation are the same, it may be possible to combine two or more traction unit types into a single assessment.

5. EC VERIFICATION OF ROLLING STOCK SUBSYSTEM (INCLUDING THE EMS)

5.1	How can the conformity of the EMS to the TSI LOC&PAS be assessed?	The EMS can be verified separately (device and EMS level) from the vehicle (subsystem). An "Intermediate Statement of Verification (ISV)" is used for verification of EMS by a Notified Body in accordance to the TSI requirements. Where ISVs have been issued, the Notified Body responsible for the verification of the subsystem takes these ISVs into account, and, before issuing its certificate of verification it needs to: (a) verify that the ISV covers correctly the relevant requirements of the TSI(s); (b) check all aspects that are not covered by the ISV; and (c) check the final testing of the subsystem as a whole. Assessments already made (e.g. device type tests executed by the EMS supplier), will be taken into account by the Notified Body.
5.2	What assessment methods can be used for EC verification of the rolling stock subsystem?	The EMS is not Interoperable Constituant, it means that it needs to be assessed as part of the rolling stock subsystem. The TSI ENE permits the following combination of modules: - SB (EC type examination) + SD (EC verification based on quality management system of production process) - SB (EC type examination) + SF (EC verification based on product verification) - SH1 (EC verification based on full quality management system plus design examination) Commission Decision 2010/713/EU defines the steps and responsibilities depending on the module chosen.
5.3	How long does such an EC verification remain valid?	With regard to the EC certification, the validity of certificates and the surveillance requirements for the approval of the Quality Management system for production are fixed, and depend on the conformity assessment modules used. This clause applies to e.g. the rolling stock builder but also to the manufacturer of devices like sensors and meters that are part of the EC certification. This clause doesn't apply to the periodic re-verification or recalibration of the EMS. This is part of the maintenance activities of the rolling stock.
5.4	Can existing transducers already installed in the vehicles be re-used?	A Notified Body might be able to redefine the accuracy class in accordance with the EN 50463-2 for components previously tested in accordance with e.g. EN 60044-1 (current transformers). The TSI LOC&PAS refers to accuracy requirements of the EN 50463-2. These accuracy requirements shall be respected in order to be able to receive an EC verification.

5.5	What happens if the EMS does not comply 100% with all of the TSI requirements?	A subsystem has to be verified on full compliance to all requirements for the vehicle, including the requirements for the EMS.
5.6	Who will perform the routine tests?	A Notified Body is responsible for the design review and type tests. For the EC (European Conformity) certification in accordance with modules SB+SD (type test + quality management system of the production) there is no routine test carried out by the Notified Body. The Notified Body checks within module SD if specifications and procedures for routine testing are in place. This is applicable for the routine tests at device level and at installation level.
5.7	Can a single assessment cover a whole fleet?	A Notified Body will perform the EC certification for a vehicle of a specific design. So the EC certification shall be repeated for each traction unit type. Some design reviews or type tests executed on a device level or on an integration level might be suitable for different vehicle types. If the EMS components and the installation are the same, it may be possible to combine two or more vehicle types into a single assessment. This only applies to the installation of EMS in retrofit on TSI compliant rolling stock of different vehicle types having a similar design.

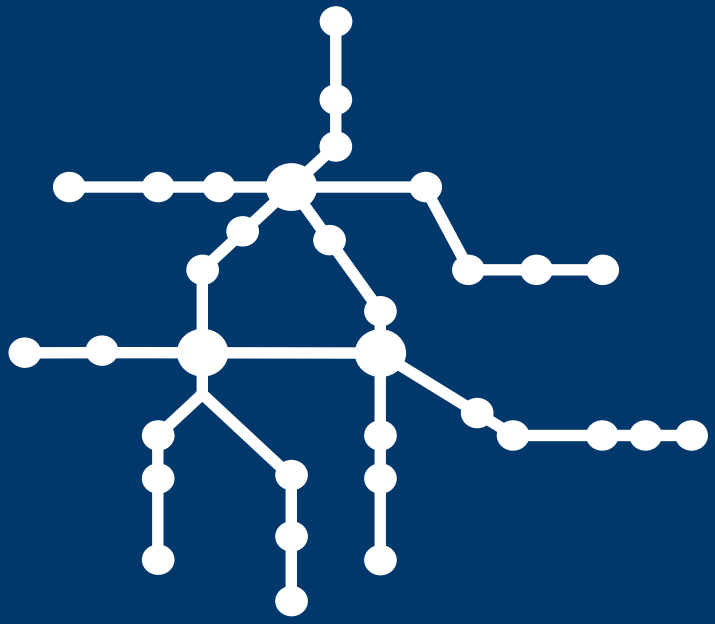
6. RECERTIFICATION AND PERIODIC RE-VERIFICATION

6.1	What to do in case of renewal or upgrading?	Article 15 (5) of Interoperability Directive 2016/797 states: “In the event of the renewal or upgrading of a subsystem resulting in an amendment to the technical file and affecting the validity of the verification procedures already carried out, the applicant shall assess the need for a new ‘EC’ declaration of verification.” Adding an EMS or replacing an EMS by a completely different design of EMS will be regarded as such an renewal or upgrading. A new EC verification may be required. If no EC verification is required, at least a product verification of EMS in accordance with EN 50463 is recommended.
6.2	What activities are part of the maintenance plan of the rolling stock?	Clause 4.2.8.2.8 of LOC&PAS TSI sets out: “The maintenance documentation described in clause 4.2.12.3 (Documentation related to Maintenance) of this TSI shall include any periodic verification procedure, in order to ensure the required accuracy level of the on-board energy measurement system during its lifetime.” In order to assess this EN 50463-2 clause 4.2.5 requires the EMS supplier to provide recommendations to the purchaser regarding any re-verification activities (testing and surveillance) that are considered necessary to ensure that the metrological performance of the functions making up the EMF (Energy Metering Function) can be expected to remain within the specified accuracies during the intended design life of the device containing these functions. Supporting evidence is needed. The EN 50463-5 clause 5.7 includes the minimal information to be included in this periodic re-verification procedure. The supplier shall state a time period for the metrological validity of the device(s). Any modifications to the EMS during the lifetime (e.g. replacement of a faulty meter) requires that the routine test is carried out with the new components installed on the vehicle. Also the device level routine test on the new components will be needed. The quality assurance processes of the vehicle owner (registered keeper) must ensure that any changes to the vehicle or to the EMS installation does not affect the conformity.

ABBREVIATIONS

CEBD	= Compiled Energy Billing Data
CMF	= Current Measurement Function
DCS	= Data Collection System
DHS	= Data Handling System
EC	= European Conformity
ECF	= Energy Calculation Function
EMS	= Energy Measuring System
EN 50463	= This norm describes the specific requirements for on-board Energy Measuring Systems (EMS)
EN 50463-1	= Describes system level requirements, common device requirements
EN 50643-2	= Describes singel function requirements of the Energy Measurement function
EN 50643-3	= Describes data handling, including DHS and DCS
EN 50643-4	= Describes communcation
EN 50463-5	= Describes Conformity Assessment
ISV	= Intermediate Statement of Verification
SB	= EC type examination
SD	= EC verification based on quality management system of production process
SF	= EC verification based on product verification
SH1	= EC verification based on fully quality management system plus design examination
TSI LOC & PAS	= Specifies the requirements for on-board metering equipment
TSI ENE	= Specifies the requirement for member states to have an on-ground energy data collecting system (DCS).
VMF	= Voltage Measurement Function

For more railway energy terminology, please visit:
http://eress.eu/railway-energy-library/railway-energy-glossary/



DISCLAIMER

Please note that this is a non-mandatory document and needs to be further developed. This document should be considered just as a starting point in the process of understanding and sharing of knowledge acquired after the Conformity Assessment Workshop organized by Eress in Amsterdam on August 30, 2016.

This first version of the "Conformity Assessment Guidelines" is based on the results of this workshop. The organizations participating at the workshop were: SBB, Sconrail, SNCF, Italcertifier, Infrabel, NS, Bane NOR, European Union Agency for Railways and Eress.

Eress plans to organize further workshops to gather the most relevant experts to discuss, understand, clarify and share new information and conclusions relevant for the railway energy industry.

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