

**Annex 1: Amendments to the technical specification for interoperability relating to the 'control-command and signalling' subsystems of the rail system in the European Union (Annex to COMMISSION REGULATION (EU) No 2016/919)**

(1) Section 1.1 is amended as follows:

- (a) in the second subparagraph, the text 'Annex I points 1.2 and 2.2 of Directive 2008/57/EC' is replaced by the text 'Annex I point 2 of Directive (EU) 2016/797';
- (b) points (1) to (4) are replaced by the following:
  - '(1) locomotives and passenger rolling stock, including thermal or electric traction units, self-propelling thermal or electric passenger trains, and passenger coach, if equipped with a driving cab.
  - (2) special vehicles, such as on-track machines, if equipped with a driving cab and intended to be used in transport mode on its own wheels.

This list of vehicles shall include those which are specially designed to operate on the different types of high-speed lines described in point 1.2. (Geographical scope).';

(2) Section 1.2 is replaced by the following:

**'1.2. Geographical Scope**

The geographical scope of this TSI is the network of the whole rail system, as described in Annex I point 1 of Directive (EU) 2016/797 and excludes the infrastructure cases referred to in Articles 1(3) and 1(4) of Directive (EU) 2016/797.

The TSI shall apply to networks with 1435 mm, 1520 mm, 1524 mm, 1600 mm and 1668 mm track gauges. However, it shall not apply to short border crossing lines with 1520 mm track gauges that are connected to the network of third countries.';

(3) Section 1.3 is amended as follows:

- (a) the text 'Article 5(3) of Directive 2008/57/EC' is replaced by the text 'Article 4(3) of Directive (EU) 2016/797';
- (b) points (8) and (9) are added after point (7) as follows:
  - '(8) indicates the provisions applicable to the existing subsystems, in particular in the event of upgrading and renewal and, in such cases, the modification work which requires an application for a new authorisation for the vehicle or trackside subsystem — Chapter 7 (Implementing the Control-Command and Signalling Subsystems TSI);
  - (9) indicates the parameters of the subsystems to be checked by the railway undertaking and the procedures to be applied to check those parameters after the delivery of the vehicle authorisation for placing on the market and before the first use of the vehicle to ensure compatibility between vehicles and the routes on which they are to be operated — Chapter 4 (Characterisation of the Subsystem).';
- (c) the text 'Article 5(5) of Directive 2008/57/EC' is replaced by the text 'Article 4(5) of Directive (EU) 2016/797';

- (4) The first paragraph of section 2.1 is replaced by the following:  
'The Control-Command and Signalling Subsystems are defined in Annex II of Directive (EU) 2016/797 as:
- (a) Trackside control-command and signalling as: "all the trackside equipment required to ensure safety and to command and control movements of trains authorised to travel on the network."
  - (b) On-board control-command and signalling as "all the on-board equipment required to ensure safety and to command and control movements of trains authorised to travel on the network. ';
- (5) Section 2.2 is amended as follows:
- (a) the text 'Class B systems for the trans-European rail system network are a limited set of train protection limited set of train protection legacy systems that were in use in the trans- European rail network before 20 April 2001' is replaced by 'Class B systems for the trans-European rail system network are a limited set of train protection and voice radio legacy systems that were already in use in the trans- European rail network before 20 April 2001';
  - (b) the text 'Class B systems for other parts of the network of the rail system in the European Union are a limited set of train protection limited set of train protection legacy systems that were in use in the trans- European rail network before 1 July 2015' is replaced by 'Class B systems for other parts of the network of the rail system in the European Union are a limited set of train protection and voice radio legacy systems that were already in use in the trans- European rail network before 1 July 2015';
  - (c) the text 'The list of Class B systems is established in the European Railway Agency technical documents 'List of CCS Class B systems, ERA/TD/2011-11, version 3.0.' is replaced by 'The list of Class B systems is established in the European Union Agency for Railways technical document 'List of CCS Class B systems, ERA/TD/2011-11.';
- (6) Section 2.3 is replaced by the following:
- '2.3 Trackside Application Levels (ETCS)*
- The interfaces specified by this TSI define the means of data transmission to, and (where appropriate) from trains. The ETCS specifications referenced by this TSI provide application levels from which a trackside implementation may choose the means of transmission that meet its requirements.
- This TSI defines the requirements for all application levels.
- For the technical definition of the ETCS application levels see Annex A, 4.1 c.';
- (7) Section 3.1 is amended as follows:
- (a) the text 'Directive 2008/57/EC' is replaced by the reference to 'Directive (EU) 2016/797';
  - (b) a new point (6) is added after point 5 as follow:  
'(6) Accessibility.';

- (8) Section 3.2.1 is replaced by the following:

*3.2.1 Safety*

Every project to which this specification is applied shall take the measures necessary to ensure that the level of risk of an incident occurring within the scope of the Control-Command and Signalling Subsystems, is not higher than the objective for the service. For this purpose the risk management process set out in Annex I to the Commission Implementing Regulation (EU) No 402/2013<sup>1</sup> shall be applied, as referred to in Article 6(1)(a) of Directive (EU)2016/798 of the European Parliament and of the Council<sup>2</sup> The correct application of the risk management process as set out in Annex I of Regulation 402/2013, as well as the appropriateness of the results from this application, must be independently assessed by a CSM assessment body according to Article 6 of that Regulation. The CSM Assessment Body must be accredited or recognised according to the requirements in Annex II of Regulation 402/2013 in the fields of “Control-command and signalling” and “System safe integration” as listed in item 5 “classification” of ERADIS database entry for Assessment Bodies.

To ensure that the measures taken to achieve safety do not jeopardise interoperability, the requirements of the basic parameter defined in point 4.2.1 (Control-Command and Signalling safety characteristics relevant to interoperability) shall be respected.

For the ETCS Class A system the safety objective is apportioned between the Control-Command and Signalling On-board and Trackside Subsystems. The detailed requirements are specified in the basic parameter defined in point 4.2.1 (Control-Command and Signalling safety characteristics relevant to interoperability). This safety requirement must be met together with the availability requirements as defined in Point 3.2.2 (Reliability and Availability).

The application of the specifications as referred to in Annex A, Table A 3 is an appropriate means to fully comply to the risk management of the Commission Implementing Regulation (EU) No 402/2013 for design, implementation, production, installation and validation (incl. Safety acceptance) of interoperability constituents and subsystems. When different specifications from the ones referred to in Annex A, Table 3 are applied, at least equivalence shall be demonstrated with the specifications in Annex A, Table 3.

To avoid unnecessary duplication of independent assessment work, the independent safety assessment activities that are required by the specifications referred to in Annex A, Table A 3 shall be carried out by an Assessment Body accredited or recognized as specified in the section above instead of a CENELEC independent safety assessor.’;

- (9) Section 3.2.5.2 is deleted;
- (10) A new section 3.2.6 is added as follows:

*3.2.6 Accessibility*

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<sup>1</sup> Commission Implementing Regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009 (OJ L 121, 3.5.2013, p. 8)

<sup>2</sup> Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety (OJ L 138, 26.5.2016, p. 102).

No requirements are mandated for the CCS subsystems for the essential requirement accessibility.’

(11) Section 4.1.1 is amended as follows:

(a) in point (16) the text ‘points 4.2.16’ is replaced by ‘point 4.2.16’;

(b) a new point (17) is added as follows:

‘(17) ETCS and Radio System Compatibility (point 4.2.17)’;

(12) In section 4.1.2 the text ‘limiting the movement of TSI-compliant on-board subsystems.’ is replaced by ‘limiting the movement of vehicles with TSI-compliant on-board subsystems.’;

(13) Table 4.1 in section 4.1.3 is replaced by:

**‘Table 4.1**

Subsystem	Part	Basic parameters
Control-Command and Signalling On-board	Train protection	4.2.1, 4.2.2, 4.2.5, 4.2.6, 4.2.8, 4.2.9, 4.2.12, 4.2.14, 4.2.16, 4.2.17
	Voice radio communication	4.2.1.2, 4.2.4.1, 4.2.4.2, 4.2.5.1, 4.2.13, 4.2.16, 4.2.17
	Data radio communication	4.2.1.2, 4.2.4.1, 4.2.4.3, 4.2.5.1, 4.2.6.2, 4.2.16, 4.2.17
Control-Command and Signalling Trackside	Train protection	4.2.1, 4.2.3, 4.2.5, 4.2.7, 4.2.8, 4.2.9, 4.2.15, 4.2.16, 4.2.17
	Voice radio communication	4.2.1.2, 4.2.4, 4.2.5.1, 4.2.7, 4.2.16, 4.2.17
	Data communication	4.2.1.2, 4.2.4, 4.2.5.1, 4.2.7, 4.2.16, 4.2.17
	Train detection	4.2.10, 4.2.11, 4.2.16

’;

(14) The title of section 4.2.1 is replaced by ‘Control-Command and Signalling reliability, availability and safety characteristics relevant to interoperability’;

(15) Section 4.2.1.1 is amended as follows:

(a) the text ‘on board’ is replaced by ‘on-board’;

(b) a new paragraph is added at the end of the section as follows:

‘Train detection equipment can be used to enable the safe movement of trains on railways. The safety requirements of such train detection equipment are dependent on the operational framework conditions and the way all functions of the trackside signalling system are actually integrated. The definition of the safety requirements of the train detection equipment shall be part of the overall risk assessment of the trackside signalling system (including the interlocking functions) using the methodology set out in Annex I of Regulation (EU) No 402/2013.’;

(16) Section 4.2.2 is replaced by the following:

‘4.2.2. *On-board ETCS functionality*

The basic parameter for ETCS on-board functionality describes all of the functions needed to run a train in a safe way. The primary function is to provide automatic train protection and cab signalling:

- (1) setting the train characteristics (e.g, maximum train speed, braking performance),
- (2) selecting the supervision mode on the basis of information from trackside,
- (3) performing odometry functions,
- (4) locating the train in a coordinate system based on Eurobalise locations,
- (5) calculating the dynamic speed profile for its mission on the basis of train characteristics and of information from trackside,
- (6) supervising the dynamic speed profile during the mission,
- (7) providing the intervention function.

These functions shall be implemented in accordance with Annex A 4.2.2 b and their performance shall conform to Annex A 4.2.2 a.

The requirements for tests are specified in Annex A 4.2.2 c.

The main functionality is supported by other functions, to which Annex A 4.2.2 a and Annex A 4.2.2 b also apply, together with the additional specifications indicated below:

- (1) Communication with the Control-Command and Signalling Trackside Subsystem.
  - (a) Eurobalise data transmission. See point 4.2.5.2 (Eurobalise communication with the train).
  - (b) Euroloop data transmission. See point 4.2.5.3 (Euroloop communication with the train). This data transmission is optional for the on-board subsystem unless operating on an ETCS level 1 line where Euroloop is installed and the release speed is set to zero for safety reasons (e.g. protection of danger points).
  - (c) Radio data transmission for radio infill. See Annex A, 4.2.2 d, point 4.2.5.1 (Radio communications with the train), point 4.2.6.2 (Interface between GSM-R Radio Data Communication and ETCS) and point 4.2.8 (Key Management). This radio data transmission is optional for the on-board subsystem unless operating on an ETCS level 1 line where radio data transmission for radio infill is installed and the release speed is set to zero for safety reasons (e.g., protection of danger points).
  - (d) Radio data transmission. See point 4.2.5.1 (Radio communications with the train), point 4.2.6.2 (Interface between GSM-R Radio Data Communication and ETCS) and point 4.2.8 (Key Management).
- (2) Communicating with the driver. See Annex A, 4.2.2 e and point 4.2.12 (ETCS DMI).
- (3) Communicating with the STM. See point 4.2.6.1 (Interface between ETCS and STM). This function includes:
  - (a) managing the STM output,
  - (b) providing data to be used by the STM,
  - (c) managing STM transitions.

- (4) Managing information about the completeness of the train (train integrity) — Supplying the train integrity to the on-board subsystem, is optional unless it is required by trackside.
  - (5) Equipment health monitoring and degraded mode support. This function includes:
    - (a) initialising the on-board ETCS functionality,
    - (b) providing degraded mode support,
    - (c) isolating the on-board ETCS functionality.
  - (6) Support data recording for regulatory purposes. See point 4.2.14 (Interface to Data Recording for Regulatory Purposes).
  - (7) Forwarding information/orders and receiving state information from rolling stock:
    - (a) to the DMI. See point 4.2.12 (ETCS DMI)
    - (b) to/from the train interface unit. See Annex A, 4.2.2 f. ';
- (17) Section 4.2.3 is replaced by the following:

*4.2.3. Trackside ETCS functionality*

This Basic parameter describes the ETCS trackside functionality. It contains all ETCS functionality to provide a safe path to a specific train.

The main functionality is:

- (1) locating a specific train in a coordinate system based on Eurobalise locations (level 2 and level 3),
- (2) translating the information from trackside signalling equipment into a standard format for the Control-Command and Signalling On-board Subsystem,
- (3) sending movement authorities including track description and orders assigned to a specific train.

These functions shall be implemented in accordance with Annex A 4.2.3 b and their performance shall conform to Annex A 4.2.3 a.

The main functionality is supported by other functions, to which Annex A 4.2.3 a and Annex A 4.2.3 b also apply, together with the additional specifications indicated below:

- (1) communicating with the Control-Command and Signalling On-board Subsystem. This includes:
  - (a) Eurobalise data transmission. See point 4.2.5.2 (Eurobalise communication with the train) and point 4.2.7.4 (Eurobalise/Line-side Electronic Unit (LEU));
  - (b) Euroloop data transmission. See point 4.2.5.3 (Euroloop communication with the train) and point 4.2.7.5 (Euroloop/LEU). Euroloop is only relevant in level 1, in which it is optional;
  - (c) Radio data transmission for radio infill. See Annex A, 4.2.3 d, point 4.2.5.1 (Radio communications with the train), point 4.2.7.3 (GSM-R/trackside ETCS functionality) and point 4.2.8 (Key Management). Radio in-fill is only relevant in level 1, in which it is optional;

- (d) Radio data transmission. See point 4.2.5.1 (Radio communications with the train), point 4.2.7.3 (GSM-R/trackside ETCS functionality) and point 4.2.8 (Key Management). Radio data transmission is only relevant to level 2 and level 3.
- (2) generating information/orders to the on-board ETCS, e.g. information related to closing/opening the air flaps, lowering/raising the pantograph, opening/closing the main power switch, changing from traction system A to traction system B. Implementation of this functionality is optional for trackside; it can however be required by other applicable TSIs or national rules or the application of risk evaluation and assessment to ensure safe integration of subsystems;
- (3) managing the transitions between areas supervised by different Radio Block Centres (RBCs) (only relevant for level 2 and level 3). See point 4.2.7.1 (Functional interface between RBCs) and point 4.2.7.2 (Technical interface between RBCs). ’;
- (18) In section 4.2.6.3 the reference to ‘4.2.6f’ is deleted.
- (19) In section 4.2.11 the text ‘Control-Command and Signalling equipment.’ is replaced by ‘Control-Command and Signalling train detection equipment.’
- (20) In section 4.2.16 the text ‘by Control-command and signalling On-board Subsystems’ is replaced by ‘by Control-command and signalling On-board Interoperability Constituents and Subsystems’;
- (21) A new section 4.2.17 is added as follows:
- 4.2.17 ETCS and Radio System Compatibility*
- Due to the different possible implementations and the status of the migration to fully compliant CCS Subsystems, checks shall be performed in order to demonstrate the technical compatibility between the on-board and trackside CCS Subsystems. The necessity of these checks shall be considered as a temporary measure increase the confidence on the technical compatibility between the CCS subsystems.
- 4.2.17.1 ETCS System Compatibility**
- ETCS System Compatibility (ESC) shall be the recording of technical compatibility between ETCS on-board and ETCS trackside parts of the CCS subsystems within an area of use.
- ESC type shall be the value assigned to record the technical compatibility between an ETCS on-board and a section within the area of use. All sections of the Union network which require the same set of checks for the demonstration of ESC shall have the same ESC type.
- 4.2.17.2 Radio System Compatibility**
- Radio System Compatibility (RSC) shall be the recording of technical compatibility between voice or data radio and GSM-R trackside parts of the CCS subsystems.
- RSC type shall be the value assigned to record the technical compatibility between a voice or data radio and a section within the area of use. All sections of the Union network which require the same set of checks for the demonstration of RSC shall have the same RSC type.’;
- (22) Section 4.3 is amended as follows:
- (a) in the title of the tables, the text ‘Clause’ is replaced by ‘Point’;
- (b) section 4.3.1 is replaced by the following:

**4.3.1 Interface to the Traffic Operation and Management Subsystem**

Interface with Traffic Operation and Management TSI			
Reference CCS TSI		Reference Traffic Operation and Management TSI <sup>3</sup>	
Parameter	Point	Parameter	Point
Operating rules (normal and degraded conditions)	4.4	Rule book Operating rules	4.2.1.2.1 4.4
Visibility of trackside Control-Command and Signalling objects	4.2.15	Signal and line-side marker sighting	4.2.2.8
Train braking performance and characteristics	4.2.2	Braking performance	4.2.2.6
Use of sanding equipment On-board flange lubrication Use of composite brake blocks	4.2.10	Rule book	4.2.1.2.1
Interface to Data Recording for Regulatory Purposes	4.2.14	Data recording onboard	4.2.3.5
ETCS DMI	4.2.12	Train running number	4.2.3.2.1
GSM-R DMI	4.2.13	Train running number	4.2.3.2.1
Key Management	4.2.8	Ensuring that the train is in running order	4.2.2.7

(c) section 4.3.2 is replaced by the following:

***4.3.2. Interface to the Rolling Stock Subsystem***

<sup>3</sup> Commission Regulation (EU) 2015/995 of 8 June 2015 amending Decision 2012/757/EU concerning the technical specification for interoperability relating to the 'operation and traffic management' subsystem of the rail system in the European Union



Interface with Rolling Stock TSIs				
Reference CCS TSI		Reference Rolling Stock TSIs		
Parameter	Point	Parameter		Point
Compatibility with trackside train detection systems: vehicle design	4.2.10	Rolling stock characteristics to be compatible with train detection systems based on track circuits	HS RS TSI <sup>4</sup> wheelset location	4.2.7.9.2
			axle load	4.2.3.2
			sanding	4.2.3.10
		Rolling stock characteristics to be compatible with train detection systems based on axle counters	electrical resistance between wheels	4.2.3.3.1
			CR RS TSI <sup>5</sup>	4.2.3.3.1.1
			LOC & PAS TSI <sup>6</sup>	4.2.3.3.1.1
Rolling stock characteristics to be compatible with loop equipment	Wagon TSI <sup>7</sup>	4.2.3.2		
	HS RS TSI wheelset geometry	4.2.7.9.2		
	wheels	4.2.7.9.3		
Electromagnetic compatibility between rolling stock and Control-Command and Signalling trackside equipment	4.2.11	Rolling stock characteristics to be compatible with train detection systems based on track circuits	CR RS TSI	4.2.3.3.1.2
			LOC & PAS TSI	4.2.3.3.1.2
			Wagon TSI	4.2.3.3
Rolling stock characteristics to be compatible with train detection systems based on axle counters	HS RS TSI	None		
	CR RS TSI	4.2.3.3.1.3		
	LOC & PAS TSI	4.2.3.3.1.3		
Wagon TSI	4.2.3.3			
Rolling stock characteristics to be compatible with train detection systems based on axle counters	4.2.11	Rolling stock characteristics to be compatible with train detection systems based on track circuits	HS RS TSI	4.2.6.6.1
			CR RS TSI	4.2.3.3.1.1
			LOC & PAS TSI	4.2.3.3.1.1
Rolling stock characteristics to be compatible with train detection systems based on axle counters	4.2.11	Rolling stock characteristics to be compatible with train detection systems based on axle counters	Wagon TSI	4.2.3.3
			HS RS TSI	4.2.6.6.1
			CR RS TSI	4.2.3.3.1.2
LOC & PAS TSI	4.2.3.3.1.2			
Wagon TSI	4.2.3.3			

<sup>4</sup> HS RS TSI is Commission Decision of 21 February 2008 concerning a technical specification for interoperability relating to the rolling stock sub-system of the trans-European high-speed rail system (2008/232/CE)

<sup>5</sup> CR RS TSI is Commission Decision of 26 April 2011 concerning a technical specification for interoperability relating to the rolling stock subsystem — Locomotives and passenger rolling stock of the trans-European conventional rail system (2011/291/EU)

<sup>6</sup> LOC & PAS TSI is 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

<sup>7</sup> Wagon TSI is Commission Regulation (EU) No 321/2013 of 13 March 2013 concerning the technical specification for interoperability relating to the subsystem rolling stock — freight wagons of the rail system in the European Union and repealing Decision 2006/861/EC

Interface with Rolling Stock TSIs				
Reference CCS TSI		Reference Rolling Stock TSIs		
Parameter	Point	Parameter		Point
Train braking performance and characteristics	4.2.2	Emergency braking performance	HS RS TSI Emergency braking Service braking	4.2.4.1 4.2.4.4
			CR RS TSI Emergency braking Service braking	4.2.4.5.2 4.2.4.5.3
			LOC & PAS TSI Emergency braking Service braking	4.2.4.5.2 4.2.4.5.3
			Wagon TSI	4.2.4.1.2
Position of Control-Command and Signalling on-board antennas	4.2.2	Kinematic gauge	HS RS TSI	4.2.3.1
			CR RS TSI	4.2.3.1
			LOC & PAS TSI	4.2.3.1
			Wagon TSI	none
Isolation of on-board ETCS functionality	4.2.2	Operating rules	HS RS TSI	4.2.7.9.1
			CR RS TSI	4.2.12.3
			LOC & PAS TSI	4.2.12.3
			Wagon TSI	none
Data interfaces	4.2.2	Monitoring and diagnostic concepts	HS RS TSI	4.2.7.10
			CR RS TSI	4.2.1.1
			LOC & PAS TSI	4.2.1.1
			Wagon TSI	None
Visibility of trackside Control-Command and Signalling objects	4.2.15	External visibility Head lights	HS RS TSI	4.2.7.4.1.1
			CR RS TSI	4.2.7.1.1
			LOC & PAS TSI	4.2.7.1.1
			Wagon TSI	None
		Driver's external field of view	HS RS TSI line of sight windscreen	4.2.2.6 b 4.2.2.7
			CR RS TSI line of sight windscreen	4.2.9.1.3.1 4.2.9.2
			LOC & PAS TSI line of sight windscreen	4.2.9.1.3.1 4.2.9.2
			Wagon TSI	None
Interface to data recording for regulatory purposes	4.2.14	Recording device	HS RS TSI	4.2.7.10
			CR RS TSI	4.2.9.6
			LOC & PAS TSI	4.2.9.6
			Wagon TSI	none
Commands to rolling stock equipment	4.2.2	Phase separation	HS RS TSI	4.2.8.3.6.7
	4.2.3		CR RS TSI	4.2.8.2.9.8
			LOC & PAS TSI	4.2.8.2.9.8
			Wagon TSI	none

Interface with Rolling Stock TSIs				
Reference CCS TSI		Reference Rolling Stock TSIs		
Parameter	Point	Parameter		Point
Emergency braking command	4.2.2	Emergency braking command	HS RS TSI	none
			CR RS TSI	4.2.4.4.1
			LOC & PAS TSI	4.2.4.4.1
			Wagon TSI	none
Construction of equipment	4.2.16	Material requirements	HS RS TSI	4.2.7.2.2
			CR RS TSI	4.2.10.2.1
			LOC&PAS TSI	4.2.10.2.1
			Wagon TSI	none

(d) in section 4.3.4 the text ‘Phase separation points’ is replaced by ‘Phase separation sections’;

(23) In section 4.4 the text ‘Traffic Operation and Management TSI’ is replaced by ‘Operation and Traffic Management TSI’.

(24) In section 4.5.1 at the end of point (1) the following text is added ‘For equipment error corrections see point 6.5.’.

(25) Section 4.8 is replaced by:

#### *‘4.8 Registers*

The data to be provided for the registers provided for in Articles 48 and 49 of Directive (EU) 2016/797 are those indicated in Commission Implementing Regulation 2001//665/EU<sup>8</sup> and Commission Implementing Regulation (EU) XXX<sup>9</sup>.’;

(26) A new section 4.9 is added below section 4.8 as follows:

#### *‘4.9. Route compatibility checks before the use of authorised vehicles*

The parameters of the on-board CCS subsystem to be used by the railway undertaking, for the purpose of route compatibility check, are described in Appendix D1 of Regulation XXX (OPE TSI)<sup>10</sup>.’;

(27) Section 5.1 is replaced by the following:

#### *‘5.1 Definition*

In accordance with Article 2(7) of Directive (EU) 2016/797, interoperability constituents means any elementary component, group of components, subassembly or complete assembly of equipment incorporated or intended to be incorporated into a subsystem, upon which the

<sup>8</sup> Commission Implementing Decision 2011/665/EU of 4 October 2011 on the European register of authorised types of railway vehicles (OJ L 264, 8.10.2011, p 32).

<sup>9</sup> Regulation on the common specifications of the railway register of infrastructure and repealing Decision 2014/880/EU

<sup>10</sup> Regulation concerning the technical specification for interoperability relating to the ‘operation and traffic management’ subsystem of the rail system in the European Union and repealing Commission Decision 2012/757/EU

interoperability of the rail system depends directly or indirectly, including both tangible objects and intangible objects.’;

(28) In section 5.2.2 a new paragraph is added at the end of the section as follows:

‘Compliance of interfaces internal to the group of ICs to basic parameters of Chapter 4 does not have to be verified. Compliance of interfaces external to the group of ICs has to be verified to demonstrate conformity with the basic parameters related to the requirements of these external interfaces.’;

(29) Section 5.3 is amended as follows:

(a) Table 5.1.a is replaced by:

**‘Table 5.1.a Basic interoperability constituents in the Control-Command and Signalling On-board Subsystem**

1	2	3	4
N	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
1	ETCS on-board	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		On-board ETCS functionality (excluding odometry)	4.2.2
		ETCS and GSM-R air gap interfaces <ul style="list-style-type: none"> <li>RBC</li> <li>Radio in-fill unit (data transmission optional)</li> <li>Eurobalise air gap</li> <li>Euroloop air gap (data transmission optional)</li> </ul>	4.2.5 4.2.5.1 4.2.5.1 4.2.5.2 4.2.5.3
		Interfaces <ul style="list-style-type: none"> <li>STM (implementation of interface K optional)</li> <li>GSM-R ETCS Data Only Radio</li> <li>Odometry</li> <li>Key management system</li> <li>ETCS ID Management</li> <li>ETCS Driver-Machine Interface</li> <li>Train interface</li> <li>On-board recording device</li> </ul>	4.2.6.1 4.2.6.2 4.2.6.3 4.2.8 4.2.9 4.2.12 4.2.2 4.2.14
		Construction of equipment	4.2.16
2	Odometry equipment	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		On-board ETCS functionality: only Odometry	4.2.2
		Interfaces <ul style="list-style-type: none"> <li>On-board ETCS</li> </ul>	4.2.6.3
		Construction of equipment	4.2.16

1	2	3	4
N	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
3	Interface of External STM	Interfaces <ul style="list-style-type: none"> <li>On-board ETCS</li> </ul>	4.2.6.1
4	GSM-R voice cab radio  Note: SIM card, antenna, connecting cables and filters are not part of this interoperability constituent	Reliability, Availability, Maintainability, (RAM)	4.2.1.2 4.5.1
		Basic communication functions	4.2.4.1
		Voice and operational communication applications	4.2.4.2
		Interfaces <ul style="list-style-type: none"> <li>GSM-R air gap</li> <li>GSM-R Driver-Machine Interface</li> </ul>	4.2.5.1 4.2.13
		Construction of equipment	4.2.16
5	GSM-R ETCS Data only Radio  Note: SIM card, antenna, connecting cables and filters are not part of this interoperability constituent	Reliability, Availability, Maintainability (RAM)	4.2.1.2 4.5.1
		Basic communication functions	4.2.4.1
		ETCS data communication applications	4.2.4.3
		Interfaces <ul style="list-style-type: none"> <li>On-board ETCS</li> <li>GSM-R air gap</li> </ul>	4.2.6.2 4.2.5.1
		Construction of equipment	4.2.16
6	GSM-R SIM card  Note: it is the responsibility of the GSM-R network operator to deliver to railway undertakings the SIM cards to be inserted in GSM-R terminal equipment	Basic communication functions	4.2.4.1
		Construction of equipment	4.2.16

’;

(b) table 5.1.b is replaced by:

**‘Table 5.1.b Groups of interoperability constituents in the Control-Command and Signalling On-board Subsystem**

This table is an example to show the structure. Other groups are allowed.

1	2	3	4
N	Group of Interoperability constituents	Characteristics	Specific requirements to be assessed by reference to Chapter 4
1	ETCS on-board Odometry equipment	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		On-board ETCS functionality	4.2.2
		ETCS and GSM-R air gap interfaces <ul style="list-style-type: none"> <li>• RBC</li> <li>• Radio in-fill unit (data transmission optional)</li> <li>• Eurobalise air gap</li> <li>• Euroloop air gap (data transmission optional)</li> </ul>	4.2.5 4.2.5.1 4.2.5.1 4.2.5.2 4.2.5.3
		Interfaces <ul style="list-style-type: none"> <li>• STM (implementation of interface K optional)</li> <li>• GSM-R ETCS Data Only Radio</li> <li>• Key management system</li> <li>• ETCS-ID Management</li> <li>• ETCS Driver Machine Interface</li> <li>• Train interface</li> <li>• On-board recording device</li> </ul>	4.2.6.1 4.2.6.2 4.2.8 4.2.9 4.2.12 4.2.2 4.2.14
		Construction of equipment	4.2.16

’;

(c) table 5.2.a is replaced by:

**‘Table 5.2.a Basic interoperability constituents in the Control-Command and Signalling Trackside Subsystem**

1	2	3	4
N	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
1	RBC	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		Trackside ETCS functionality (excluding communication via Eurobalises, radio in-fill and Euroloop)	4.2.3
		ETCS and GSM-R air gap interfaces: only radio communication with train	4.2.5.1
		Interfaces <ul style="list-style-type: none"> <li>• Neighbouring RBC</li> <li>• Data radio communication</li> <li>• Key management system</li> <li>• ETCS-ID Management</li> </ul>	4.2.7.1, 4.2.7.2 4.2.7.3 4.2.8 4.2.9
		Construction of equipment	4.2.16
2	Radio in-fill unit	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		Trackside ETCS functionality (excluding communication via Eurobalises, Euroloop and level 2 and level 3 functionality)	4.2.3
		ETCS and GSM-R air gap interfaces: only radio communication with train	4.2.5.1
		Interfaces <ul style="list-style-type: none"> <li>• Data radio communication</li> <li>• Key management system</li> <li>• ETCS-ID Management</li> <li>• Interlocking and LEU</li> </ul>	4.2.7.3 4.2.8 4.2.9 4.2.3
		Construction of equipment	4.2.16
3	Eurobalise	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		ETCS and GSM-R air gap interfaces: only Eurobalise communication with train	4.2.5.2
		Interfaces <ul style="list-style-type: none"> <li>• LEU - Eurobalise</li> </ul>	4.2.7.4
		Construction of equipment	4.2.16
4	Euroloop	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		ETCS and GSM-R air gap interfaces: only Euroloop communication with train	4.2.5.3

1	2	3	4
N	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
		Interfaces	
		• LEU – Euroloop	4.2.7.5
		Construction of equipment	4.2.16
5	LEU Eurobalise	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		Trackside ETCS functionality (excluding communication via radio in-fill, Euroloop and level 2 and level 3 functionality)	4.2.3
		Interfaces	
		• LEU - Eurobalise	4.2.7.4
		Construction of equipment	4.2.16
6	LEU Euroloop	Reliability, Availability, Maintainability, Safety (RAMS)	4.2.1 4.5.1
		Trackside ETCS functionality (excluding communication via radio in-fill, Eurobalise and level 2 and level 3 functionality)	4.2.3
		Interfaces	
		• LEU – Euroloop	4.2.7.5
		Construction of equipment	4.2.16
7	Axle Counter		
		Trackside train detection systems (only parameters relevant for axle counters)	4.2.10
		Electromagnetic compatibility (only parameters relevant for axle counters)	4.2.11
		Construction of equipment	4.2.16

’;

(30) Section 6.1 is replaced by the following:

‘6.1. Introduction

*6.1.1. General principles*

6.1.1.1. Compliance with basic parameters

Fulfilment of the essential requirements set out in Chapter 3 of this TSI shall be ensured through compliance with the basic parameters specified in Chapter 4.

This compliance shall be demonstrated by:

- (1) assessing the conformity of the interoperability constituents specified in Chapter 5 (see point 6.2.1, 6.2.2, 6.2.3, 6.2.4),
- (2) verifying the subsystems (see point 6.3 and point 6.4).



#### 6.1.1.2. Essential requirements fulfilled by National Rules

In certain cases, some of the essential requirements may be met by national rules, because of:

- (1) the use of Class B systems,
- (2) open points in the TSI,
- (3) non-application of TSIs (derogations) under Article 7 of Directive (EU) 2016/797,
- (4) specific cases described in point 7.6.

In such cases, assessment of conformity with those rules shall be carried out under the responsibility of the Member States concerned according to notified procedures. See point 6.4.2.

#### 6.1.1.3. Partial fulfilment of TSI requirements

With regard to checking if essential requirements are fulfilled through compliance with the basic parameters, and without prejudice to the obligations set out in Chapter 7 of this TSI, control-command and signalling interoperability constituents and subsystems that do not implement all functions, performance and interfaces as specified in Chapter 4 (including the specifications referred to in Annex A), can obtain EC certificates of conformity or, respectively, certificates of verification, under the following conditions for issuing and using the certificates:

- (1) The applicant for EC verification of a trackside control-command and signalling subsystem is responsible for deciding which functions, performance and interfaces need to be implemented to meet the objectives for the service and to ensure that no requirements contradicting or exceeding the TSIs are exported to the on-board control-command and signalling subsystems;
- (2) The operation of an on-board control-command and signalling subsystem, that does not implement all functions, performance and interfaces specified in this TSI, may be subject to conditions and limits of use due to compatibility and/or safe integration with trackside control-command and signalling subsystems. Without prejudice to the tasks of a Notified Body described in respective Union legislation and related documents the applicant for EC verification is responsible for ensuring that the technical file provides all the information<sup>11</sup> that an operator needs to identify such conditions and limits of use.
- (3) The authorising entity may refuse for duly justified reasons the authorisation for placing in service or on the market, or place conditions and limits of use on the operation, of control-command and signalling subsystems that do not implement all functions, performance and interfaces specified in this TSI.

If a control-command and signalling interoperability constituent or subsystem does not implement all functions, performance and interfaces specified in this TSI, the provisions of point 6.4.3 shall apply.

### 6.1.2. Principles for testing ETCS and GSM-R

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<sup>11</sup> The template to be used to provide this information will be defined in the Application Guide.

#### 6.1.2.1. Principle

The principle is that a Control-Command and Signalling On-board Subsystem covered by an 'EC' declaration of verification is able to run on every Control-Command and Signalling Trackside Subsystem covered by an 'EC' Declaration of verification, under the conditions specified in this TSI, with no additional verifications.

Achievement of this principle is facilitated by:

- (1) rules for the design and installation of the Control-Command and Signalling On-board and the Trackside subsystems,
- (2) test specifications to prove that the Control-Command and Signalling On-board and Trackside Subsystems comply with the requirements of this TSI and are mutually compatible.

#### 6.1.2.2. Operational test scenarios

For the purpose of this TSI, an “operational test scenario” means the description of the intended railway system operation in situations relevant for ETCS and GSM-R (e.g. entry of a train into an equipped area, awakening of a train, overriding a signal at stop), by means of a sequence of trackside and on-board events related to or influencing the Control-command and Signalling subsystems (e.g. sending/receiving messages, exceeding a speed limit, actions of operators ) and the specified timing between them.

The operational tests scenarios are based on the engineering rules adopted for the project.

Check of compliance of a real implementation with an operational tests scenario shall be possible gathering information through easily accessible interfaces (preferably the standard interfaces specified in this TSI).

#### 6.1.2.3. Requirements for Operational test scenarios

The set of engineering rules for the trackside parts of ETCS and GSM-R and related operational test scenarios for the Trackside Control-command and Signalling Subsystem shall be sufficient to describe all intended system operations relevant for the Trackside Control-command and Signalling Subsystem in normal and identified degraded situations, and:

- (1) shall be consistent with the specifications referenced in this TSI;
- (2) shall assume that functions, interfaces and performance of the Control-command and Signalling On-board Subsystems interacting with the Trackside Subsystem are compliant with the requirements of this TSI;
- (3) shall be the ones used in the EC Verification of the Trackside Control-command and Signalling Subsystem, to check that the implemented functions, interfaces and performance are able to ensure that the intended system operation in combination with the relevant modes and transitions between levels and modes of the Control-command and Signalling On-board Subsystems are respected.

#### 6.1.2.4. Requirements for ETCS System Compatibility

The Agency shall set up and manage the set of checks to demonstrate the technical compatibility of an on-board subsystem with the trackside subsystem in a technical document.

Infrastructure Managers shall notify to the Agency the definition of the necessary checks to demonstrate:

- (a) the technical compatibility of an on-board subsystem with the trackside subsystem on their network by the end of December 2020 at the latest,
- (b) the technical compatibility of an on-board subsystem with a trackside subsystem to be placed in service at least three months before the placing in service.

Infrastructure Managers shall classify the ETCS lines according to ESC types.

Infrastructure Managers shall notify any changes on the necessary checks for their network to demonstrate the technical compatibility of an on-board subsystem with the trackside subsystem.

#### 6.1.2.5. Requirements for Radio System Compatibility

The Agency shall set up and manage the set of checks to demonstrate the technical compatibility of an on-board subsystem with the trackside subsystem in a technical document.

Infrastructure Managers shall notify to the Agency the definition of the necessary checks to demonstrate:

- (a) the technical compatibility of an on-board subsystem with the trackside subsystem on their network by the end of December 2020 at the latest,
- (b) the technical compatibility of an on-board subsystem with a trackside subsystem to be placed in service at least three months before the placing in service.

Infrastructure Managers shall classify their lines according to RSC types for voice and, if applicable, ETCS data.

Infrastructure Managers shall notify any changes on the necessary checks for their network to demonstrate the technical compatibility of an on-board subsystem with the trackside subsystem.

’;

(31) Section 6.2 is amended as follows:

- (a) in section 6.2.1, the text ‘Article 13 and Annex IV to Directive 2008/57/EC’ is replaced by the text ‘Article 10(1) and Article 9(2) of Directive (EU) 2016/797’;
- (b) in section 6.2.2, the text ‘Directive 2008/57/EC’ is replaced by the text ‘Directive (EU) 2016/797’;
- (c) table 6.1 is replaced by the following:

**‘Table 6.1 Conformity assessment requirements of an interoperability constituent or a group of interoperability constituents**

N	Aspect	What to assess	supporting evidence
1	Functions, interfaces and performances	Check that all mandatory functions, interfaces and performances as described in the basic parameters referenced in the relevant table of Chapter 5 are implemented and that they comply with the requirements of this TSI	design documentation and running of test cases and test sequences, as described in the basic parameters referenced in the relevant table of Chapter 5

N	Aspect	What to assess	supporting evidence
		Check which optional functions and interfaces as described in the basic parameters referenced in the relevant table of Chapter 5 are implemented and that they comply with the requirements of this TSI	design documentation and running of test cases and test sequences, as described in the basic parameters referenced in the relevant table of Chapter 5
		Check which additional functions and interfaces (not specified in this TSI) are implemented and that they do not lead to conflicts with implemented functions specified in this TSI	Impact analysis
2	Construction of equipment	<p>Check compliance with mandatory conditions, where specified in the basic parameters referenced in the relevant table of Chapter 5</p> <p>In addition, check that the interoperability constituent functions correctly in the environmental conditions for which it is designed</p>	<p>Documentation on material used and, where necessary, tests to ensure that the requirements of the basic parameters referenced in the relevant table of Chapter 5 are satisfied</p> <p>Tests according to the applicant's specifications</p>
3	Reliability, Availability, Maintainability, Safety (RAMS)	<p>Check compliance with the safety requirements described in the basic parameters referenced in the relevant table of Chapter 5, i.e.</p> <ol style="list-style-type: none"> <li>1. respect for quantitative Tolerable Hazard Rates (THR) caused by random failures</li> <li>2. the development process is able to detect and eliminate systematic failures</li> </ol>	<ol style="list-style-type: none"> <li>1. Calculations for the THRs caused by random failures, supported by reliability data.</li> <li>2.1. The manufacturer's quality and safety management throughout design, manufacturing and testing conforms to a recognised standard (see note)</li> <li>2.2. The software development life-cycle, the hardware development life-cycle and the integration of hardware and software have each been undertaken in accordance with a recognised standard (see note)</li> </ol>

N	Aspect	What to assess	supporting evidence
			<p>2.3. The safety verification and validation process has been undertaken in accordance with a recognised standard (see Note) and respects the safety requirements described in the basic parameters referenced in the relevant table of Chapter 5</p> <p>2.4. The functional and technical safety requirements (correct operation under fault-free conditions, effects of faults and of external influences) are verified in accordance with a recognised standard (see Note)</p> <p>Note: The standard shall satisfy at least the following requirements:</p> <ol style="list-style-type: none"> <li>1. be compliant with the requirements for code of practice, as stated in Annex 1, point 2.3.2, of Regulation (EU) 402/2013</li> <li>2. be widely acknowledged in the railway domain. If this is not the case, the standard will have to be justified and be acceptable to the Notified Body;</li> <li>3. be relevant for the control of the considered hazards in the system under assessment;</li> <li>4. be publicly available for all actors who want to use it.</li> </ol>
4		Check that the quantitative reliability target (related to random failures) indicated by the applicant is met	Calculations

N	Aspect	What to assess	supporting evidence
5		Elimination of systematic failures	<p>Tests of equipment (full Interoperability Constituent or separately for subassemblies) in operational conditions, with repair when defects are detected.</p> <p>Documentation accompanying the certificate which indicates which kind of verifications have been performed,, which standards have been applied and criteria adopted to consider these tests completed (according to decisions of the applicant).</p>
6		Check compliance with maintenance requirements – point 4.5.1	Document check

’;

(d) sections 6.2.5 and 6.2.6 are deleted;

(32) Section 6.3 is amended as follows:

(a) section 6.3.1 is replaced by the following:

**‘6.3.1. Assessment procedures for Control-Command and Signalling Subsystems**

This Chapter deals with the 'EC' declaration of verification for the Control-Command and Signalling On-board Subsystem and the 'EC' declaration of verification for the Control-Command and Signalling Trackside Subsystem.

At the request of the applicant the Notified Body shall carry out an 'EC' verification of a Control-Command and Signalling On-board or Trackside Subsystem in accordance with Annex IV to Directive (EU) 2016/797.

The applicant shall draw up the 'EC' declaration of verification for the Control-Command and Signalling On-board or Trackside Subsystem in accordance with Article 15(1) and Article 15(9) of Directive (EU) 2016/797.

The content of the 'EC' declaration of verification shall conform to Article 15(9) of Directive (EU) 2016/797.

The assessment procedure shall be carried out using the modules specified in point 6.3.2 (Modules for Control-Command and Signalling Subsystems).

The 'EC' declarations of verification for a Control-Command and Signalling On-board Subsystem and of a Control-Command and Signalling Trackside Subsystem, together with the certificates of conformity, shall be deemed sufficient to ensure that the subsystems are compatible under the conditions specified in this TSI. ’;

(b) section 6.3.2.3 is replaced by the following:

**‘6.3.2.3. Conditions for using modules for On-board and Trackside Subsystems**

With reference to point 4.2 of Module SB (type-examination), design review is requested.

With reference to point 4.2 of Module SH1 (full quality management system with design examination), an additional type test is required. ’;

(c) in section 6.3.3, Table 6.2 is replaced by the following:

**‘Table 6.2 Conformity assessment requirements for an On-board Subsystem**

N	Aspect	What to assess	supporting evidence
1	Use of interoperability constituents	<p>Check whether the interoperability constituents to be integrated into the subsystem are all covered by an ‘EC’ Declaration of conformity and a corresponding certificate.</p> <p>The Subsystem needs to be checked with a SIM card compliant with the requirements of this TSI. Changing the SIM card with another one compliant with the TSI is not a modification of the Subsystem.</p>	Existence and content of documents
		<p>Check conditions and limits of use on the use of Interoperability Constituents against the characteristics of the subsystem and of the environment</p>	Analysis by document check
		<p>For interoperability constituents that have been certified against a version of the CCS TSI, which is different from the version applied for the ‘EC’ Verification of the subsystem and / or against a set of specifications which is different from the set of specifications applied for the ‘EC’ Verification of the subsystem, check that the certificate still ensures compliance with the requirements of the TSI currently in force.</p>	Impact analysis by document checks
2	Integration of interoperability constituents in the subsystem	<p>Check the correct installation and functioning of the internal interfaces of the subsystem - Basic parameter 4.2.6</p>	Checks according to specifications
		<p>Check that additional functions (not specified in this TSI) do not impact the mandatory ones</p>	Impact analysis
		<p>Check that the values of ETCS IDs are within the allowed range and, if required by this TSI, have unique values – Basic parameter 4.2.9</p>	Check of design specifications
3	Integration with rolling stock	<p>Check the correct installation of equipment - Basic Parameters 4.2.2, 4.2.4, 4.2.14 and conditions for installation of equipment, as specified by the manufacturer</p>	Results of checks (according to specifications referenced in the Basic Parameters and the manufacturer's installation rules)

N	Aspect	What to assess	supporting evidence
		Check that the Control-Command and Signalling On-board Subsystem is compatible with the rolling stock environment – Basic parameter 4.2.16	Document check (certificates of interoperability constituents and possible integration methods checked against characteristics of rolling stock)
		Check that parameters (e.g, braking parameters) are correctly configured and that they are within the allowed range	Document check (values of parameters checked against characteristics of rolling stock)
4	Integration with Class B	Check that the external STM is connected to on-board ETCS with TSI-compliant interfaces	Nothing to test: there is a standard interface already tested at interoperability constituent level. Its functioning has already been tested when checking the integration of interoperability constituents in the subsystem
		Check that Class B functions implemented in the on-board ETCS– Basic parameter 4.2.6.1 - create no additional requirements for the Control-Command and Signalling Trackside Subsystem due to transitions	Nothing to test: everything has already been tested at interoperability constituent level
		Check that separate Class B equipment which is not connected to the on-board ETCS– Basic Parameter 4.2.6.1 - creates no additional requirements for Control-Command and Signalling Trackside Subsystem due to transitions	nothing to test: no interface <sup>12</sup>
		Check that separate Class B equipment connected on-board ETCS using (partly) non TSI compliant interfaces – basic parameter 4.2.6.1 - creates no additional requirements for the Control-Command and Signalling Trackside Subsystem due to transitions. Also check that ETCS functions are not affected	impact analysis

<sup>12</sup> In this case, the assessment of the management of transitions shall be according to national specifications.



N	Aspect	What to assess	supporting evidence
5	Integration with Control-Command and Signalling Trackside Subsystems	Check that Eurobalise telegrams can be read (scope of this test is limited to checking that the antenna has been appropriately installed. The tests already carried out at Interoperability Constituent level shall not be repeated) – Basic Parameter 4.2.5	Test using a certified Eurobalise : the ability to read correctly the telegram is the supporting evidence.
		Check that Euroloop telegrams (if applicable) can be read – Basic Parameter 4.2.5	Test using a certified Euroloop : the ability to read correctly the telegram is the supporting evidence.
		Check that the equipment can handle a GSM-R call for voice and data (if applicable) – Basic Parameter 4.2.5	Test with a certified GSM-R network. The ability to set up, maintain and disconnect a connection is the supporting evidence.
6	Reliability, Availability, Maintainability, Safety (RAMS)	Check that the equipment complies with safety requirements - Basic Parameter 4.2.1	Application of procedures specified in the Common Safety Method for Risk Evaluation and Assessment.
		Check that the quantitative reliability target is met - Basic Parameter 4.2.1	Calculations
		Check the compliance with requirements about maintenance – point 4.5.2	Documents check

N	Aspect	What to assess	supporting evidence
7	Integration with Control-Command and Signalling Trackside Subsystems and other subsystems: tests under conditions representing the intended operation.	<p>Test the behaviour of the subsystem under as many different conditions as reasonably possible representing the intended operation (e.g line gradient, train speed, vibrations, traction power, weather conditions, design of Control-Command and Signalling trackside functionality). The test must be able to verify:</p> <ol style="list-style-type: none"> <li>1. that odometry functions are correctly performed - basic parameter 4.2.2</li> <li>2. that the on-board Control-Command and Signalling Subsystem is compatible with the rolling stock environment – basic parameter 4.2.16</li> </ol> <p>These tests must also be such as to increase confidence that there will be no systematic failures.</p> <p>The scope of these tests excludes tests already carried out at different stages: tests performed on the interoperability constituents and tests performed on the subsystem in a simulated environment shall be taken into account.</p> <p>Tests under environmental conditions are not necessary for on-board GSM-R voice equipment.</p> <p>Note: Indicate in the certificate which conditions have been tested and which standards have been applied.</p>	Reports of test runs.

;

(d) a new section 6.3.3.1 is added after table 6.2 as follows:

**‘6.3.3.1. ETCS and radio system compatibility checks**

Particular attention shall be given to assessing the conformity of the on-board CCS subsystem regarding the Basic Parameter ETCS and radio system compatibility referred to in 4.2.17.

Regardless of the selected module previously used for the on-board subsystem certificate, the Notified Body shall check;

- (a) the availability of the result of the technical compatibility checks for the selected area of use of the vehicle.
- (b) The technical compatibility checks have been performed in accordance with the technical document published by the Agency.
- (c) The technical compatibility checks results indicate all the incompatibilities and errors encountered during the technical compatibility checks.

The Notified Body shall not check again any aspect covered in the subsystem certificate.

Performing these checks also at the level of Interoperability Constituent may reduce the amount of checks at the level of Control-command and Signalling Subsystem. ’;

- (e) in section 6.3.4, table 6.3 is replaced by the following:

**‘Table 6.3 Conformity assessment requirements for a Trackside Subsystem**

N	Aspect	What to assess	supporting evidence
1	Use of interoperability constituents	Check that all interoperability constituents to be integrated into the subsystem are covered by an EC declaration of conformity and the corresponding certificate.	Existence and content of documents
		Check conditions and limits of use on the use of interoperability constituents against the characteristics of the subsystem and of the environment	Impact analysis by documents check
		For interoperability constituents that have been certified against a version of the Control-Command and Signalling TSI, which is different from the version applied for the ‘EC’ Verification of the subsystem and / or against a set of specifications which is different from the set of specifications applied for the ‘EC’ Verification of the subsystem, check that the certificate still ensures compliance with the requirements of the TSI currently in force	impact analysis by comparison of specifications referenced in the TSI and certificates of the interoperability constituents
2	Integration of interoperability constituents in the subsystem	Check that the internal interfaces of the subsystem have been installed properly and function properly - Basic parameters 4.2.5, 4.2.7 and conditions specified by the manufacturer (N/A for IC axle counter)	checks according to specifications
		Check that additional functions (not specified in this TSI) do not impact the mandatory ones	impact analysis
		Check that the values of ETCS IDs are within the allowed range and, if required by this TSI, have unique values – Basic Parameter 4.2.9 (N/A for IC axle counter)	check of design specifications

N	Aspect	What to assess	supporting evidence
		<p>For IC axle counters (only):</p> <p>The integration of the IC in the subsystem has to be verified:</p> <p>Check index 77 document points 3.1.2.4 and 3.1.2.5 only.</p> <p>Check the correct installation of equipment and conditions specified by the manufacturer.</p> <p>Note: Compliance with RAMS requirements to be checked under row 8.</p>	Document check
3	Visibility of trackside Control-Command objects	Check that requirements for marker boards specified in this TSI are fulfilled (characteristics, compatibility with the infrastructure requirements (gauge, ...), compatibility with the driver's field of view) – Basic parameter 4.2.15	Design documentation, results of tests or test runs with TSI compliant rolling stock
4	Integration with infrastructure	<p>Check that the equipment has been properly installed - Basic parameters 4.2.3, 4.2.4 and conditions for installation specified by the manufacturer</p> <p>Check that the Control-Command and Signalling Trackside subsystem equipment is compatible with the trackside environment – Basic parameter 4.2.16</p>	<p>Results of checks (according to specifications referenced in the basic parameters and manufacturer's installation rules)</p> <p>Document check (certificates of interoperability constituents and possible methods of integration checked against trackside characteristics)</p>
5	Integration with trackside signalling	<p>Check that all functions required by the application are implemented in accordance with specifications referenced in this TSI - Basic parameter 4.2.3</p> <p>Check the correct configuration of parameters (Eurobalise telegrams, RBC messages, marker boards positions, etc.)</p> <p>Check that the interfaces are correctly installed and function properly.</p> <p>Check that the Control-Command and Signalling Trackside subsystem operates correctly according to information at the interfaces with trackside signalling (e.g., appropriate generation of Eurobalise telegrams by a LEU or of message by RBC)</p>	<p>Document check (applicant's design specification and certificates of interoperability constituents)</p> <p>Document check (values of parameters checked against characteristics of trackside and of signalling)</p> <p>Design verification and tests according to information supplied by the applicant</p> <p>Design verification and tests according to the information supplied by the applicant</p>

N	Aspect	What to assess	supporting evidence
6	Integration with Control-Command and Signalling On-board Subsystems and with rolling stock	Check the GSM-R coverage - Basic Parameter 4.2.4	On site measurements
		Check that all functions required by the application are implemented in accordance with specifications referenced in this TSI - basic parameters 4.2.3, 4.2.4 and 4.2.5	Reports of the operational test scenarios specified in point 6.1.2 with at least two certified Control-Command and Signalling On-board Subsystems from different suppliers. The report shall indicate which operational test scenarios have been tested, which on-board equipment has been used and whether tests have been performed in laboratories, test lines or real implementation.
7	Compatibility of train detection systems  (Excluding axle counters)	<p>Check that the train detection systems comply with the requirements of this TSI - Basic parameters 4.2.10 and 4.2.11</p> <p>Check the correct installation of equipment and conditions specified by the manufacturer.</p> <p>Note: Compliance with RAMS requirements to be checked under row 8.</p>	<p>Evidence of compatibility of equipment from existing installations (for systems already in use); perform tests according to standards for new types.</p> <p>On-site measurements to prove correctness of installation.</p> <p>Document check of correct installation of equipment.</p>
8	Reliability, Availability, Maintainability, Safety (RAMS)	Check compliance with safety requirements - Basic Parameter 4.2.1.1	Application of procedures specified in the Common Safety Method for Risk Evaluation and Assessment
		Check that quantitative reliability targets are respected - Basic Parameter 4.2.1.2	Calculations
		Check the compliance with requirements about maintenance – point 4.5.2	Document check

N	Aspect	What to assess	supporting evidence
9	Integration with Control-Command and Signalling On-board Subsystems and rolling stock: tests under conditions representing the intended operation.	<p>Test the behaviour of the subsystem under many different conditions as reasonably feasible representing the intended operation (e.g. train speed, number of trains on the line, weather conditions). The test must be able to verify:</p> <ol style="list-style-type: none"> <li>3. the performance of train detection systems - Basic parameters 4.2.10, 4.2.11,</li> <li>4. that the Control-Command and Signalling Trackside subsystem is compatible with trackside environment – Basic parameter 4.2.16</li> </ol> <p>These tests will also increase confidence in the absence of systematic failures.</p> <p>The scope of these tests excludes tests already done in different steps: tests performed at the level of interoperability constituents and tests performed on the subsystem in a simulated environment shall be taken into account.</p> <p>Note: Indicate in the certificate which conditions have been tested and which standards have been applied.</p>	Reports of test runs.
10	ETCS and radio System Compatibility	The necessary ESC and RSC check definition is made available to the Agency – Basic Parameter 4.2.17.	Technical compatibility checks for ESC and RSC published and maintained by the Agency.

';

(33) Section 6.4 is replaced as follows:

(a) section 6.4.1 is replaced by the following:

*'6.4.1. Assessment of parts of control-command and signalling subsystems*

Pursuant to Article 15(7) of Directive (EU) 2016/797, the Notified Body may issue certificates of verification for certain parts of a subsystem, if allowed to do so under the relevant TSI.

As pointed out in point 2.2 (Scope) of this TSI, the trackside and on-board control-command and signalling subsystems contain parts, as specified in point 4.1 (Introduction).

A certificate of verification may be issued for each part or for a combination of parts specified in this TSI; the Notified Body only checks if that particular part fulfils the TSI requirements.

Regardless of which module is chosen, the Notified Body shall check that:

(1) the TSI requirements for the part in question have been fulfilled and

(2) the fulfilment of the TSI requirements already assessed for other parts of the same subsystem has not been modified. ’;

(b) in section 6.4.2, the text ‘certificate’ is replaced by the text ‘EC certificate’;

(c) section 6.4.3.3 is replaced by the following:

‘6.4.3.3. Content of certificates

In any event, notified bodies shall coordinate with the Agency the way in which conditions and limits of use of interoperability constituents and subsystems are managed in the relevant certificates and technical files in the working group set up under Article 24 of Regulation (EU) 2016/796 of the European Parliament and of the Council. ’;

(d) Section 6.4.4 is replaced by the following:

‘6.4.4. Intermediate Statement of Verification

If conformity is assessed for parts of subsystems specified by the applicant and different from the parts allowed by point in Table 4.1 (Introduction) of this TSI, or if only certain stages of the verification procedure have been performed, only an intermediate statement of verification may be issued.’;

(34) Section 6.5 is replaced by the following:

‘6.5. *Management of errors*

Where deviations from intended functions and/or performance are detected during the tests or during the operational life of a subsystem, the applicants and/or operators shall inform the Agency and the authorising entity that issued the authorisations for the concerned trackside subsystems or vehicles, to initiate the procedures set out in Article 16 of Directive (EU) 2016/797. As a result of the application of Article 16(3) of that Directive:

(1) if the deviation is due to incorrect application of this TSI or to errors in design or installation of equipment, the applicant for the relevant certificates shall take the necessary corrective actions and the certificates affected and/or the corresponding technical file (for interoperability constituents and/or subsystems) shall be updated;

(2) if the deviation is due to errors in this TSI or in specifications referenced therein, the procedure set out in Article 6 of the Directive (EU) 2016/797 shall be initiated.

The Agency shall organise an efficient processing of all the information received in order to facilitate the Change Control Management process for improvement/further development of the specifications, including the test specifications. ’;

(35) Section 7.2 is amended as follows:

(a) two new sections 7.2.1a and 7.2.1b are added below section 7.2.1 as follows:

‘7.2.1a *Changes to an existing On-Board subsystem*

This point defines the principles to be applied by the applicants and authorising entities in line with the EC verification procedure described in Article 15(9), Article 21(12) and Annex IV of Directive (EU) 2016/797. This procedure is further developed in Article 13, 15 and 16 of Commission Implementing Regulation (EU) 2018/545 and in Decision 2010/713/EC.

This point applies in case of any change(s) to an existing on-board subsystem or on-board subsystem type, including renewal or upgrade. It does not apply in case of changes covered by Article 15(1)(a) of Commission Implementing Regulation (EU) 2018/545.

#### 7.2.1a.1 Rules to manage changes in on-board CCS subsystems

1. Parts, as defined in Table 4.1 of this TSI, and basic parameters of the on-board subsystem that are not affected by the change(s) are exempt from conformity assessment against the provisions in this TSI.
2. A new assessment against the requirements of the applicable TSI shall only be needed for the basic parameters which may be affected by the change(s).
3. In accordance with Articles 15 and 16 of Commission Implementing Regulation (EU) 2018/545 and Decision 2010/713/EU and by application of modules SB, SD/SF or SH1 for the EC verification, and if relevant Article 15(5) of Directive (EU) 2016/797, the applicant shall inform a notified body of all changes affecting the conformity of the subsystem with the requirements of the relevant TSI(s) requiring new checks. This information shall be provided by the applicant with corresponding references to the technical documentation relating to the existing EC certificate.
4. The applicant has to justify and document that applicable requirements remain consistent at subsystem level, and this has to be assessed by a Notified Body.
5. The changes impacting the basic design characteristics of the on-board subsystem are defined in Table 7.1. These changes shall be classified as 15(1)(c) or 15(1)(d) of Commission Implementing Regulation (EU) 2018/545.
6. Changes not covered by point 7.2.1a.1(5) above are deemed not to have any impact on the basic design characteristics and will be classified as 15(1)(a) or 15(1)(b) of Commission Implementing Regulation (EU) 2018/545.

Note: The classification of the changes set out in points 7.2.1a.2(5) and 7.2.1a.2(6) above is performed by the applicant without prejudice of the safety judgement mandated in Article 21(12)(b) of Directive (EU) 2016/797.

7. All changes shall remain compliant with the applicable TSIs regardless its classification.

**Table 7.1 Basic design characteristics**

1. TSI Point	2. Related basic design characteristic(s)	3. Changes impacting the basic design characteristic and not classified as 21(12)(a) of Directive (EU) 2016/797	4. Changes impacting the basic design characteristic and classified as 21(12)(a) of Directive (EU) 2016/797
4.2.2 On-board functionality	ETCS Set of specification of Annex A	Not Applicable	Use another Annex A set of specifications
	ETCS On-board implementation	Not Applicable	Not fulfilling all the conditions in point



1. TSI Point	2. Related basic design characteristic(s)	3. Changes impacting the basic design characteristic and not classified as 21(12)(a) of Directive (EU) 2016/797	4. Changes impacting the basic design characteristic and classified as 21(12)(a) of Directive (EU) 2016/797
			7.2.1a.2 (Functional change)
	Managing information about the completeness of the train	Not Applicable	Adding or removing train integrity
4.2.17.1 ETCS System Compatibility	ETCS System Compatibility	Adding or removing ESC statements checked by a NoBo	Not applicable
4.2.4 Mobile communication functions for railways GSM-R	GSM-R Baseline	Not Applicable	Use another Baseline
4.2.4.2 Voice and operational communication application	Voice and operational communication implementation	Not Applicable	Not fulfilling all the conditions in point 7.2.1a.3 (Functional change)
4.2.17.2 Radio System Compatibility	Radio Voice System Compatibility	Adding or removing RSC statements checked by a NoBo	Not applicable
4.2.4 Mobile communication functions for railways GSM-R	GSM-R Baseline	Not Applicable	Use another Baseline
4.2.4.3 Data communication applications for ETCS	Data communication for ETCS implementation	Not Applicable	Not fulfilling all the conditions in point 7.2.1a.3 (Functional change)
4.2.17.2 Radio System Compatibility	Radio Data System Compatibility	Adding or removing RSC statements checked by a NoBo	Not applicable
4.2.4 Mobile communication functions for railways GSM-R	SIM Card GSM-R Home Network	Replacement of a TSI compliant GSM-R SIM Card by another TSI compliant GSM-R SIM Card with a different GSM-R Home Network	Not applicable
4.2.4.1 Basic communication function	SIM Card support of Group ID 555	Change the SIM Card support of Group ID 555	Not applicable

1. TSI Point	2. Related basic design characteristic(s)	3. Changes impacting the basic design characteristic and not classified as 21(12)(a) of Directive (EU) 2016/797	4. Changes impacting the basic design characteristic and classified as 21(12)(a) of Directive (EU) 2016/797
4.2.6.1 ETCS and Class B train protection	Class B train protection legacy system	To be defined by Members States through national rules	To be defined by Members States through national rules
4.2.5.1 Radio communication with the train	Class B radio legacy system	To be defined by Members States through national rules	To be defined by Members States through national rules

9. In order to establish the EC certificate, the Notified Body may refer to:
- The original EC certificate for parts of the design that are unchanged or those that are changed but do not affect the conformity of the subsystem, as far as it is still valid.
  - Amendments to the original EC certificate for modified parts of the design that affect the conformity of the subsystem with the applicable TSI version used for the EC verification.
10. In any case, the applicant shall ensure that the technical documentation which is relating to the EC certificate is updated accordingly.
11. The updated technical documentation, related to the EC certificate is referred to in the technical file accompanying the EC declaration of verification issued by the applicant for on-board subsystem declared as conformant to the modified type.

#### 7.2.1a.2 Conditions for a change in the On-board ETCS that does not impact the basic design characteristics

1. The target functionality remains unchanged or is set to the state already expected during the original certification or authorization.
2. The interfaces relevant for safety & technical compatibility remain unchanged or are set to the state already expected during the original certification or authorization
3. An Assessment Body (CSM RA) as specified in point 3.2.1 has positively assessed the change.
4. The change is performed under a quality management system approved by a notified body (e.g. according to modules CH1, SH1, CD, SD). For other modules (e.g. CF, SF) it shall be justified that the verification performed remains valid<sup>13</sup>.
5. A release note about the change shall be made available to all interested parties (e.g. The Agency and the national safety authorities, IMs, RUs, ECMs and

<sup>13</sup> All activities required for a modification which are performed outside a quality management system approved by a notified body might require additional examinations or tests by the notified body.

keeper of the vehicle). More relevant information will be made available to the Agency and national safety authorities upon their request.

6. The system identifier does distinguish between a functional and a realization identifier.
7. The functional part of the system identifier has not been changed after the change.

7.2.1a.3 Conditions for a change in the on-board mobile communication functions for railways that does not impact the basic design characteristics

1. The target functionality remains unchanged or is set to the state already expected during the original certification or authorization.
2. The interfaces relevant for technical compatibility remain unchanged or are set to the state already expected during the original certification or authorization
3. The change is performed under a quality management system approved by a notified body (e.g. according to modules CH1, SH1, CD, SD). For other modules (e.g. CF, SF) it shall be justified that the verification performed remains valid<sup>14</sup>.
4. A release note about the change shall be made available to all interested parties (e.g. The Agency and the national safety authorities, IMs, RUs, ECMs and keeper of the vehicle). More relevant information will be made available to the Agency and national safety authorities upon their request.

7.2.1b *Changes to an existing trackside subsystem*

This point defines the principles to be applied by the applicants and authorising entities in line with the EC verification procedure described in Article 15(9), Article 18(6) of Directive (EU) 2016/797 and in Decision 2010/713/EC.

In the event of changing, upgrading or renewing the Control-Command and Signalling Subsystems bearing EC certificate of verification the following rules apply:

1. The changes require new authorisation if they impact basic parameters as defined in table 7.2.

**Table 7.2 Trackside basic parameters modifications which requires a new authorisation**

Basic Parameter		Modification which requires a new authorisation
4.2.3	Trackside ETCS functionality	Not fulfilling all the conditions in point 7.2.1b.1
4.2.4 4.2.4.2	Mobile communication functions for railways GSM-R	Not fulfilling all the conditions in point 7.2.1b.2

<sup>14</sup> All activities required for a modification which are performed outside a quality management system approved by a notified body might require additional examinations or tests by the notified body.

Basic Parameter		Modification which requires a new authorisation
	Voice and operational communication application	
4.2.4	Mobile communication functions for railways GSM-R	Not fulfilling all the conditions in point 7.2.1b.2
4.2.4.3	Data communication applications for ETCS	

2. The changes are permitted to be dealt with by only re-assessing those modifications that affect the conformity of the subsystem with the applicable TSIs version used for the EC verification. The applicant has to justify and document that applicable requirements remain consistent at subsystem level, and this has to be assessed by a Notified Body.
3. The applicant shall inform the Notified Body of all changes that may affect the conformity of the subsystem with the requirements of the relevant TSI(s) or the conditions for validity of the certificate.

This information shall be provided by the applicant with corresponding references to the technical documentation relating to the existing EC certificate.

4. In order to establish the EC certificate, the Notified Body may refer to:
  - The original EC certificate for parts of the design that are unchanged or those that are changed but do not affect the conformity of the subsystem, as far as it is still valid.
  - Additional EC certificate (amending the original certificate) for modified parts of the design that affect the conformity of the subsystem with the applicable TSI version used for the EC verification.
5. In any case, the applicant shall ensure that the technical documentation which is relating to the EC certificate is updated accordingly.

7.2.1b.1 Conditions for a change in the trackside ETCS functionality that requires new authorisation for placing in service if not fulfilled

1. The target functionality remains unchanged or is set to the state already expected during the original certification or authorization.
2. The interfaces relevant for safety & technical compatibility remain unchanged or are set to the state already expected during the original certification or authorization.
3. An Assessment Body (CMS-RA) as specified in point 3.2.1 has positively assessed the change.
4. The change is performed under a quality management system approved by a notified body (e.g. according to modules CH1, SH1, CD, SD). For other modules (e.g. CF, SF) it shall be justified that the verification performed remains valid<sup>15</sup>.

<sup>15</sup> All activities required for a modification which are performed outside a quality management system approved by a notified body might require additional examinations or tests by the notified body.

5. A release note about the change shall be made available to all interested parties (e.g. The Agency and the national safety authorities, IMs, RUs, ECMs and keeper of the vehicle). More relevant information will be made available to the Agency and national safety authorities upon their request.
6. The system identifier does distinguish between a functional and a realization identifier
7. The functional part of the system identifier has not been changed after the change.

7.2.1b.2 Conditions for a change in the trackside mobile communication functions for railways that requires a new authorisation for placing in service if not fulfilled

1. The target functionality remains unchanged or is set to the state already expected during the original certification or authorization.
2. The interfaces relevant for technical compatibility remain unchanged or are set to the state already expected during the original certification or authorization.
3. The change is performed under a quality management system approved by a notified body (e.g. according to modules CH1, SH1, CD, SD). For other modules (e.g. CF, SF) it shall be justified that the verification performed remains valid<sup>16</sup>.
4. A release note about the change shall be made available to all interested parties (e.g. The Agency and the national safety authorities, IMs, RUs, ECMs and keeper of the vehicle). More relevant information will be made available to the Agency and national safety authorities upon their request.

’;

- (b) in section 7.2.3, the text ‘Article 29(1) of Directive 2008/57/EC’ is replaced by ‘Article 51(1) of Directive (EU) 2016/797’;
- (c) section 7.2.6 is replaced by the following:

*7.2.6. Conditions for mandatory and optional functions*

The applicant for EC verification of a Control-command and Signalling Trackside subsystem shall check whether Control-command and Signalling Trackside functions, which are defined “optional” in this TSI, are required by other TSIs or national rules or by the application of risk evaluation and assessment to ensure safe integration of subsystems.

The trackside implementation of national or optional functions must not prevent the use of that infrastructure by a train that complies only with the mandatory requirements of the On-board Class A system except as required for the following on-board optional functions:

- (1) An ETCS Level 3 Trackside application requires that the on-board is able to confirm the train integrity;

<sup>16</sup> All activities required for a modification which are performed outside a quality management system approved by a notified body might require additional examinations or tests by the notified body.

- (2) An ETCS Level 1 Trackside application with infill requires that the on-board is equipped with the corresponding in-fill data transmission (Euroloop or radio) if the release speed is set to zero for safety reasons (e.g. protection of danger points).
- (3) When ETCS needs data transmission by radio, the data radio communication part as specified in this TSI is required.

An on-board subsystem, which incorporates a KER STM, may make it necessary to implement the K-interface. ';

(36) Section 7.3.2 is amended as follows:

- (a) the text 'point' is replaced by 'section';
- (b) the text 'already in service' is replaced by 'already on the market';

(37) Section 7.4.1 is replaced by:

*7.4.1 Trackside installations*

Articles 1, 2 and Annex I to Commission Implementing Regulation (EU) 2017/6 of 5 January 2017 on the European Rail Traffic Management System European deployment plan shall apply as referred to in Article 47 of Regulation (EU) No 1315/2013.

*7.4.1.1 High-speed network*

It is mandatory to fit ETCS track-side when:

1. installing for the first time the train protection part of a Control-Command and Signalling Trackside Subsystem (with or without a Class B system); or
2. upgrading the existing train protection part of a Control-Command and Signalling Trackside Subsystem, where this would change the functions, performance and/or interoperability-relevant interfaces (air gaps) of the existing legacy system. This does not apply to modifications deemed necessary to mitigate safety-related defects in the legacy installation. ';

(38) Section 7.4.2.1 is amended as follows:

*7.4.2.1. New vehicles*

1. New vehicles authorised to be placed on the market for the first time shall be equipped with ETCS in accordance with Annex A of this TSI.
2. The requirement to be equipped with ETCS does not apply to:
  - (1) new mobile railway infrastructure construction and maintenance equipment,
  - (2) new shunting locomotives,
  - (3) other new vehicles not intended for operating on high-speed lines;
    - (a) if they are intended exclusively for national service operated outside the corridors defined in point Annex I of Commission Implementing Regulation (EU) 2017/6 and outside the lines ensuring the connections to the main European ports, marshalling yards, freight terminals and freight transport areas defined in Article 2(1) of Commission Implementing Regulation (EU) 2017/6 or

- (b) if they are intended for off-TEN cross-border service, i.e., service until the first station in the neighbouring country or to the first station where there are connections further in the neighbouring country.
3. All vehicle type authorisations granted based on set of specifications #1 referred to in Table 2.1 of Appendix A of this TSI shall not remain valid. Vehicle authorisations for new vehicles shall only be based on set of specifications #2 or #3 referred to in Table 2.1 of Appendix A of this TSI. ’;
- (39) In section 7.4.3, the text ‘placing in service’ is replaced by ‘placing on the market’;
- (40) Section 7.4.4 is amended as follows:
- (a) In the first paragraph the text ‘those lines with ETCS and decommissioning of class B systems’ is replaced by ‘those lines with ETCS and Class A Radio and decommissioning of class B systems’;
- (b) In point (1) the text ‘cost benefit analysis of ETCS implementation’ is replace by ‘cost benefit analysis of ETCS and Class A Radio implementation’;
- (c) In point (4)(i) the text ‘The dates of ETCS deployment’ is replace by ‘The dates of ETCS and Class A Radio deployment’;
- (d) In the third paragraph the text ‘at least every five years.’ is replace by ‘at least every five year. The update of the national implementation plans shall take into account the introduction of the next generation communication system(s), e.g. by indicating the date of start of operation and, when applicable, the date of decommissioning of GSM-R on (parts of) the Network.’;
- (e) the text ‘Article 29(1) of Directive 2008/57/EC’ is replaced by ‘Article 51(1) of Directive (EU) 2016/797’;
- (41) In section 7.5 the fourth paragraph is replaced by the following:  
‘Implementing a train detection system that is compliant with the requirements of this TSI can be done independently of the installation of ETCS or GSM-R.’;
- (42) A new section 7.5a is added below section 7.5 as follows:  
*‘7.5a ETCS and radio system compatibility checks implementation rules*  
Existing vehicles shall be deemed compatible with the ETCS and radio system compatibility types of the networks on which they are operating at the end of December 2020 without any further checks. ’;
- (43) In section 7.6.1, the text ‘points below should be read’ is replaced by ‘points below shall be read’;
- (44) Section 7.6.2.1 is amended as follows;
- (a) the text ‘the vehicle should have’ is replaced by ‘the vehicle shall have’;
- (b) the text ‘Index 77, point 3.1.2.4’ is replace by ‘Index 77, point 3.1.2.3’;
- (c) the text ‘Index 77, point 3.1.8’ is replace by ‘Index 77, point 3.1.7’;
- (45) Section 7.6.2.2 is amended as follows:
- (a) the text ‘Index 77, point 3.1.2.4’ is replace by ‘Index 77, point 3.1.2.3’;

- (b) In the last two rows in the third column of the table, the text ‘set of specifications 2’ is replaced by ‘set of specifications 2 or 3’;
- (46) Section 7.6.2.3 is amended as follows:
- (a) the text ‘Index 77, point 3.1.2.4’ is replaced by ‘Index 77, point 3.1.2.3’;
  - (b) the text ‘Index 77, point 3.1.8’ is replaced by ‘Index 77, point 3.1.7’;
  - (c) in the first row in the second column of the table; the text ‘T3’ is replaced by ‘P’;
  - (d) in the first row in the third column of the table, the text ‘This Specific Case is linked with the use of TVM’ is replaced by ‘This Specific Case is linked with the use of track circuits using electrical joints’;
  - (e) in the first row in the first column of the table, the text ‘the vehicle should have’ is replaced by ‘the vehicle shall have’;
  - (f) a new row is added at the end of the table as follows:

<p>4.2.10 Trackside Train Detection Systems</p> <p>Index 77, point 3.1.4.1.</p> <p>In addition to the TSI requirements, the allowed maximum amount of sand per unit and per rail within 30 s is: 750 g</p>	<p>P</p>	<p>This specific case is linked to the use of track circuits with a higher sensitivity regarding the isolation layer between wheels and rails due to sanding on the French Network</p>
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- (47) Section 7.6.2.6 is replaced by the following:
- ‘7.6.2.6. Sweden

Specific case	Category	Notes
<p>4.2.4 Mobile communication functions for railways – GSM-R</p> <p>Index 33, statement 4.2.3:</p> <p>It is permissible to put on the market on-board Control-Command and Signalling Subsystems including 2 Watt GSM-R voice cab radios and ETCS data only radios. The subsystems shall be able to operate in networks with -82 dBm.</p>	<p>P</p>	<p>No impact on interoperability</p>
<p>4.2.10 – Trackside Train Detection Systems</p> <p>Index 77, point 3.1.2.1:</p> <p>Maximum axle distance between two axles <math>\leq</math> 17,5 m (ai in Fig. 1, point 3.1.2.1).</p>	<p>P</p>	
<p>4.2.10 – Trackside Train Detection Systems</p> <p>Index 77, point 3.1.2.3:</p> <p>Minimum axle distance between first and last axle <math>\geq</math> 4,5 m (L-b1-b2 in Fig. 1, point 3.1.2.3).</p>	<p>P</p>	



Specific case	Category	Notes
<p>4.2.10 – Trackside Train Detection Systems</p> <p>Index 77, point 3.2.2.5:</p> <p>Frequency range: 0,0-2,0 Hz</p> <p>Interference current limit [rms value]: 25,0 A</p> <p>Evaluation method: Low-Pass filter</p> <p>Evaluation parameters: (Down sampling to 1 kHz, followed by) 2.0 Hz 4th order Butterworth low-pass filter, followed by an ideal rectifier to give the absolute value.</p> <p>The maximum interference current for a rail vehicle must not exceed 25,0 A in the frequency range 0,0-2,0 Hz. Inrush current may exceed 45,0 A for less than 1,5 seconds and 25 A for less than 2,5 seconds.</p>	P	

’;

(48) In section 7.6.2.7 the text ‘Index 77, point 3.1.2.4’ is replace by ‘Index 77, point 3.1.4.1’

(49) In section 7.6.2.8 a new row is added at the end of the table as follows:

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<p>4.2.10 Trackside Train Detection Systems</p> <p>Index 77, point 3.2.2.5:</p> <p>Frequency range: 93 - 110 Hz</p> <p>Interference current limit [rms value]:</p> <p>2.8 A (for influencing unit)</p> <p>2 A (for one traction unit)</p> <p>Evaluation method: Band Pass Filters</p> <p>Evaluation parameters:</p> <ul style="list-style-type: none"> <li>• BP filter characteristics:</li> </ul> <p>Centre frequencies: 95, 96, 98, 100, 104, 106 and 108 Hz</p> <p>3dB-Bandwidth: 4 Hz</p> <p>Butterworth, 6th order</p> <ul style="list-style-type: none"> <li>• RMS calculation:</li> </ul> <p>Integration time: 0.5 s</p> <p>Time overlap: 50 %</p>	T3	<p>This specific case is needed because these track circuits may be modified by shifting the center frequency from 100 Hz to 106,7 Hz. This would make obsolete a vehicle related NTR requiring a 100 Hz monitoring system.</p>
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(50) A new section 7.6.2.9 is added after 7.6.2.8 as follows:

‘7.6.2.9 Italy

Specific case	Category	Notes
4.2.10 – Trackside Train Detection Systems Index 77, point 3.2.2.4 and point 3.2.2.6: Frequency range: 82 - 86 Hz Interference current limit [rms value]: 1.125 A Evaluation method: FFT Evaluation parameters: Time window 1s, Hanning window, 50% overlap, average on 6 consecutive windows	P	

’;

(51) A new section 7.6.2.10 is added after 7.6.2.9 as follows:

‘7.6.2.10 Czech Republic

Specific case	Category	Notes
<p>4.2.10 — Trackside Train Detection Systems</p> <p>Index 77, point 3.2.2.4 and point 3.2.2.6:</p> <p>Frequency range: 70.5 - 79.5 Hz</p> <p>Interference current limit [rms value]: 1 A</p> <p>Evaluation method: Band Pass Filters</p> <p>Evaluation parameters:</p> <ul style="list-style-type: none"> <li>· BP filter characteristics:</li> </ul> <p>Centre frequencies: 73,75, 77 Hz (continuous band)</p> <p>3dB-Bandwidth: 5 Hz</p> <p>Butterworth, order 2*4</p> <ul style="list-style-type: none"> <li>· RMS calculation:</li> </ul> <p>Integration time: 0.5 s</p> <p>Time overlap: min 75 %</p> <p>Frequency range: 271.5 – 278.5 Hz</p> <p>Interference current limit [rms value]: 0.5 A</p> <p>Evaluation method: Band Pass Filters</p> <p>Evaluation parameters:</p> <ul style="list-style-type: none"> <li>· BP filter characteristics:</li> </ul> <p>Centre frequencies: 274, 276 Hz (continuous band)</p> <p>3dB-Bandwidth: 5 Hz</p> <p>Butterworth, order 2*4</p> <ul style="list-style-type: none"> <li>· RMS calculation:</li> </ul> <p>Integration time: 0.5 s</p> <p>Time overlap: min 75 %</p>	T3	<p>This specific case is needed as long as track circuits type EFCP are used.</p>

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- (52) A new section 7.6.2.11 is added after 7.6.2.10 as follows:
- ‘7.6.2.10 The Netherlands

Specific case	Category	Notes
<p>4.2.10 — Trackside Train Detection Systems</p> <p>Index 77, point 3.2.2.6:</p> <p>Frequency range: 65-85 Hz (ATBEG limit)</p> <p>Interference current limit [rms value]: 0,5 A</p> <p>Evaluation method: Band Pass Filters</p> <p>Evaluation parameters:</p> <ul style="list-style-type: none"> <li>• BP filter characteristics</li> </ul> <p>Centre frequency: 75 Hz</p> <p>3dB-Bandwith: 20 Hz</p> <p>20dB-Bandwith: 40 Hz</p> <ul style="list-style-type: none"> <li>• RMS calculation</li> </ul> <p>Integration time: 5 s</p> <p>Time overlap: 80%</p> <p>Transient shorter than 1s only exceeding the ATBEG limit and not the GRS limit may be ignored.</p> <p>Frequency range: 65-85 Hz (GRS TC limit)</p> <p>Interference current limit [rms value]: 1,7 A</p> <p>Evaluation method: Band Pass Filters</p> <p>Evaluation parameters:</p> <ul style="list-style-type: none"> <li>• BP filter characteristics</li> </ul> <p>Centre frequency: 75 Hz</p> <p>3dB-Bandwith: 20 Hz</p> <p>20dB-Bandwith: 40 Hz</p> <ul style="list-style-type: none"> <li>• RMS calculation</li> </ul> <p>Integration time: 1,8 s</p> <p>Time overlap: 80%</p>	<p>T3</p>	<p>This Specific Cases is needed in the context of the Class-B system ATBEG.</p>

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(53) Annex A is replaced by the following:

## ‘Annex A

### References

For each reference made in the basic parameters (Chapter 4 of this TSI) the following table indicates the corresponding mandatory specifications, via the Index in Table A 2 (Table A 2.1, Table A 2.2, Table A 2.3).

Table A 1

Reference in Chapter 4	Index number (see Table A 2)
<b>4.1</b>	
4.1 a	Intentionally deleted
4.1 b	Intentionally deleted
4.1 c	3
<b>4.2.1</b>	
4.2.1 a	27, 78
<b>4.2.2</b>	
4.2.2 a	14
4.2.2 b	1, 4, 13, 15, 60
4.2.2 c	31, 37b, c, d
4.2.2 d	18, 20
4.2.2 e	6
4.2.2 f	7, 81, 82
<b>4.2.3</b>	
4.2.3 a	14
4.2.3 b	1, 4, 13, 15, 60
4.2.3 c	Intentionally deleted
4.2.3 d	18, 21
<b>4.2.4</b>	
4.2.4 a	64, 65
4.2.4 b	66
4.2.4 c	67
4.2.4 d	68

Reference in Chapter 4	Index number (see Table A 2)
4.2.4 e	73, 74
4.2.4 f	32, 33
4.2.4 g	48
4.2.4 h	69, 70
4.2.4 j	71, 72
4.2.4 k	75, 76
<b>4.2.5</b>	
4.2.5 a	64, 65
4.2.5 b	10, 39, 40
4.2.5 c	19, 20
4.2.5 d	9, 43
4.2.5 e	16, 50
<b>4.2.6</b>	
4.2.6 a	8, 25, 26, 36 c, 49, 52
4.2.6 b	29, 45
4.2.6 c	46
4.2.6 d	34
4.2.6 e	20
4.2.6 f	Intentionally deleted
<b>4.2.7</b>	
4.2.7 a	12
4.2.7 b	62, 63
4.2.7 c	34
4.2.7 d	9
4.2.7 e	16
<b>4.2.8</b>	
4.2.8 a	11, 79, 83
<b>4.2.9</b>	
4.2.9 a	23

Reference in Chapter 4	Index number (see Table A 2)
<b>4.2.10</b>	
4.2.10 a	77 (point 3.1)
<b>4.2.11</b>	
4.2.11 a	77 (point 3.2)
<b>4.2.12</b>	
4.2.12 a	6, 51
<b>4.2.13</b>	
4.2.13 a	32, 33, 51, 80
<b>4.2.14</b>	
4.2.14 a	5
<b>4.2.15</b>	
4.2.15 a	38

### **Specifications**

One of the three tables in Table A 2 (Table A 2.1, Table A 2.2, Table A 2.3) of this Annex shall be applied for the trackside subsystem. For the on-board subsystem either Table A 2.2 or Table A 2.3 shall be applied.

When a document listed in Table A 2 incorporates, by copying or by reference to, a clearly identified point of another document, this point, and only this, shall be considered a part of the document listed in Table A 2.

For the purposes of this TSI, when a document listed in Table A 2 makes a “mandatory” or “normative” reference to a document not listed in Table A 2, the referenced document shall always be understood as an acceptable means of compliance with basic parameters (that can be used for certification of Interoperability Constituents and Subsystems and not requiring future revisions of the TSI) and not as a mandatory specification.

Note: specifications indicated as ‘Reserved’ in Table A 2 are also listed as open points in Annex G when there is a need for notification of national rules to close the corresponding open points. Reserved documents not listed as open points are intended as improvements to the system.

Table A 2.1 - List of mandatory specifications

Index N	Set of specifications # 1 (only for trackside Subsystems) (ETCS Baseline 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
1	ERA/ERTMS/003204	ERTMS/ETCS Functional requirement specification	5.0	
2	Intentionally deleted			
3	SUBSET-023	Glossary of Terms and Abbreviations	2.0.0	
4	SUBSET-026	System Requirements Specification	2.3.0	
5	SUBSET-027	FFFIS Juridical recorder-downloading tool	2.3.0	Note 1
6	SUBSET-033	FIS for man-machine interface	2.0.0	
7	SUBSET-034	FIS for the train interface	2.0.0	
8	SUBSET-035	Specific Transmission Module FFFIS	2.1.1	
9	SUBSET-036	FFFIS for Eurobalise	2.4.1	
10	SUBSET-037	EuroRadio FIS	2.3.0	
11	SUBSET-038	Offline key management FIS	2.3.0	
12	SUBSET-039	FIS for the RBC/RBC handover	2.3.0	
13	SUBSET-040	Dimensioning and Engineering rules	2.3.0	
14	SUBSET-041	Performance Requirements for Interoperability	2.1.0	
15	SUBSET-108	Interoperability related consolidation on TSI Annex A documents	1.2.0	
16	SUBSET-044	FFFIS for Euroloop	2.3.0	
17	Intentionally deleted			
18	SUBSET-046	Radio infill FFFS	2.0.0	
19	SUBSET-047	Trackside-Trainborne FIS for Radio infill	2.0.0	
20	SUBSET-048	Trainborne FFFIS for Radio infill	2.0.0	
21	SUBSET-049	Radio infill FIS with LEU/interlocking	2.0.0	
22	Intentionally deleted			
23	SUBSET-054	Responsibilities and rules for the assignment of values to ETCS variables	2.1.0	
24	Intentionally deleted			
25	SUBSET-056	STM FFFIS Safe time layer	2.2.0	
26	SUBSET-057	STM FFFIS Safe link layer	2.2.0	
27	SUBSET-091	Safety Requirements for the Technical Interoperability of ETCS in Levels 1 and 2	2.5.0	
28	Intentionally deleted			
29	SUBSET-102	Test specification for interface "K"	1.0.0	
30	Intentionally deleted			



Index N	Set of specifications # 1 (only for trackside Subsystems) (ETCS Baseline 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
31	SUBSET-094	Functional requirements for an onboard reference test facility	2.0.2	
32	EIRENE FRS	GSM-R Functional requirements specification	8.0.0	Note 10
33	EIRENE SRS	GSM-R System requirements specification	16.0.0	Note 10
34	A11T6001	(MORANE) Radio Transmission FFFIS for EuroRadio	13.0.0	
35	Intentionally deleted			
36 a	Intentionally deleted			
36 b	Intentionally deleted			
36 c	SUBSET-074-2	FFFIS STM Test cases document	1.0.0	
37 a	Intentionally deleted			
37 b	SUBSET-076-5-2	Test cases related to features	2.3.3	
37 c	SUBSET-076-6-3	Test sequences	2.3.3	
37 d	SUBSET-076-7	Scope of the test specifications	1.0.2	
37 e	Intentionally deleted			
38	06E068	ETCS Marker-board definition	2.0	
39	SUBSET-092-1	ERTMS EuroRadio Conformance Requirements	2.3.0	
40	SUBSET-092-2	ERTMS EuroRadio test cases safety layer	2.3.0	
41	Intentionally deleted			
42	Intentionally deleted			
43	SUBSET 085	Test specification for Eurobalise FFFIS	2.2.2	
44	Intentionally deleted			
45	SUBSET-101	Interface "K" Specification	1.0.0	
46	SUBSET-100	Interface "G" Specification	1.0.1	
47	Intentionally deleted			
48	Reserved	Test specification for mobile equipment GSM-R		Note 4
49	SUBSET-059	Performance requirements for STM	2.1.1	
50	SUBSET-103	Test specification for Euroloop	1.0.0	
51	Reserved	Ergonomic aspects of the DMI		
52	SUBSET-058	FFFIS STM Application layer	2.1.1	
53	Intentionally deleted			
54	Intentionally deleted			
55	Intentionally deleted			

Index N	Set of specifications # 1 (only for trackside Subsystems) (ETCS Baseline 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
56	Intentionally deleted			
57	Intentionally deleted			
58	Intentionally deleted			
59	Intentionally deleted			
60	Intentionally deleted			
61	Intentionally deleted			
62	Reserved	RBC-RBC Test specification for safe communication interface		
63	SUBSET-098	RBC-RBC Safe Communication Interface	1.0.0	
64	EN 301 515	Global System for Mobile Communication (GSM); Requirements for GSM operation on railways	2.3.0	Note 2
65	TS 102 281	Detailed requirements for GSM operation on railways	3.0.0	Note 3
66	TS 103 169	ASCI Options for Interoperability	1.1.1	
67	(MORANE) P 38 T 9001	FFFS for GSM-R SIM Cards	5.0	Note 10
68	ETSI TS 102 610	Railway Telecommunication; GSM; Usage of the UUIE for GSM operation on railways	1.3.0	
69	(MORANE) F 10 T 6002	FFFS for Confirmation of High Priority Calls	5.0	
70	(MORANE) F 12 T 6002	FIS for Confirmation of High Priority Calls	5.0	
71	(MORANE) E 10 T 6001	FFFS for Functional Addressing	4.1	
72	(MORANE) E 12 T 6001	FIS for Functional Addressing	5.1	
73	(MORANE) F 10 T6001	FFFS for Location Dependent Addressing	4	
74	(MORANE) F 12 T6001	FIS for Location Dependent Addressing	3	
75	(MORANE) F 10 T 6003	FFFS for Presentation of Functional Numbers to Called and Calling Parties	4	
76	(MORANE) F 12 T 6003	FIS for Presentation of Functional Numbers to Called and Calling Parties	4	
77	ERA/ERTMS/033281	Interfaces between CCS trackside and other subsystems	4.0	Note 7
78	Reserved	Safety requirements for ETCS DMI functions		
79	Not applicable	Not applicable		
80	Not applicable	Not applicable		
81	Not applicable	Not applicable		
82	Not applicable	Not applicable		

Table A 2.2 - List of mandatory specifications

Index N	Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
1	Intentionally deleted			
2	Intentionally deleted			
3	SUBSET-023	Glossary of Terms and Abbreviations	3.1.0	
4	SUBSET-026	System Requirements Specification	3.4.0	
5	SUBSET-027	FIS Juridical Recording	3.1.0	
6	ERA_ERTMS_015560	ETCS Driver Machine interface	3.4.0	
7	SUBSET-034	Train Interface FIS	3.1.0	
8	SUBSET-035	Specific Transmission Module FFFIS	3.1.0	
9	SUBSET-036	FFFIS for Eurobalise	3.0.0	
10	SUBSET-037	EuroRadio FIS	3.1.0	
11	SUBSET-038	Offline key management FIS	3.0.0	
12	SUBSET-039	FIS for the RBC/RBC handover	3.1.0	
13	SUBSET-040	Dimensioning and Engineering rules	3.3.0	
14	SUBSET-041	Performance Requirements for Interoperability	3.1.0	
15	Intentionally deleted			
16	SUBSET-044	FFFIS for Euroloop	2.4.0	
17	Intentionally deleted			
18	Intentionally deleted			
19	SUBSET-047	Trackside-Trainborne FIS for Radio infill	3.0.0	
20	SUBSET-048	Trainborne FFFIS for Radio infill	3.0.0	
21	Intentionally deleted			
22	Intentionally deleted			
23	SUBSET-054	Responsibilities and rules for the assignment of values to ETCS variables	3.0.0	
24	Intentionally deleted			
25	SUBSET-056	STM FFFIS Safe time layer	3.0.0	
26	SUBSET-057	STM FFFIS Safe link layer	3.0.0	
27	SUBSET-091	Safety Requirements for the Technical Interoperability of ETCS in Levels 1 and 2	3.4.0	
28	Intentionally deleted			
29	SUBSET-102	Test specification for interface "K"	2.0.0	
30	Intentionally deleted			
31	SUBSET-094	Functional requirements for an onboard reference test facility	3.0.0	

Index N	Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
32	EIRENE FRS	GSM-R Functional requirements specification	8.0.0	Note 10
33	EIRENE SRS	GSM-R System requirements specification	16.0.0	Note 10
34	A11T6001	(MORANE) Radio Transmission FFFIS for EuroRadio	13.0.0	
35	Intentionally deleted			
36 a	Intentionally deleted			
36 b	Intentionally deleted			
36 c	SUBSET-074-2	FFFIS STM Test cases document	3.0.0	
37 a	Intentionally deleted			
37 b	SUBSET-076-5-2	Test cases related to features	3.2.0	
37 c	SUBSET-076-6-3	Test sequences	3.1.0	
37 d	SUBSET-076-7	Scope of the test specifications	3.2.0	
37 e	Intentionally deleted			
38	06E068	ETCS Marker-board definition	2.0	
39	SUBSET-092-1	ERTMS EuroRadio Conformance Requirements	3.0.0	
40	SUBSET-092-2	ERTMS EuroRadio test cases safety layer	3.0.0	
41	Intentionally deleted			
42	Intentionally deleted			
43	SUBSET 085	Test specification for Eurobalise FFFIS	3.0.0	
44	Intentionally deleted			
45	SUBSET-101	Interface "K" Specification	2.0.0	
46	SUBSET-100	Interface "G" Specification	2.0.0	
47	Intentionally deleted			
48	Reserved	Test specification for mobile equipment GSM-R		Note 4
49	SUBSET-059	Performance requirements for STM	3.0.0	
50	SUBSET-103	Test specification for Euroloop	1.1.0	
51	Intentionally deleted			
52	SUBSET-058	FFFIS STM Application layer	3.1.0	
53	Intentionally deleted			
54	Intentionally deleted			
55	Intentionally deleted			
56	Intentionally deleted			

Index N	Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
57	Intentionally deleted			
58	Intentionally deleted			
59	Intentionally deleted			
60	SUBSET-104	ETCS System Version Management	3.2.0	
61	Intentionally deleted			
62	Intentionally deleted			
63	SUBSET-098	RBC-RBC Safe Communication Interface	3.0.0	
64	EN 301 515	Global System for Mobile Communication (GSM); Requirements for GSM operation on railways	2.3.0	Note 2
65	TS 102 281	Detailed requirements for GSM operation on railways	3.0.0	Note 3
66	TS 103 169	ASCI Options for Interoperability	1.1.1	
67	(MORANE) P 38 T 9001	FFIS for GSM-R SIM Cards	5.0	Note 10
68	ETSI TS 102 610	Railway Telecommunication; GSM; Usage of the UUIE for GSM operation on railways	1.3.0	
69	(MORANE) F 10 T 6002	FFFS for Confirmation of High Priority Calls	5.0	
70	(MORANE) F 12 T 6002	FIS for Confirmation of High Priority Calls	5.0	
71	(MORANE) E 10 T 6001	FFFS for Functional Addressing	4.1	
72	(MORANE) E 12 T 6001	FIS for Functional Addressing	5.1	
73	(MORANE) F 10 T 6001	FFFS for Location Dependent Addressing	4	
74	(MORANE) F 12 T 6001	FIS for Location Dependent Addressing	3	
75	(MORANE) F 10 T 6003	FFFS for Presentation of Functional Numbers to Called and Calling Parties	4	
76	(MORANE) F 12 T 6003	FIS for Presentation of Functional Numbers to Called and Calling Parties	4	
77	ERA/ERTMS/033281	Interfaces between CCS trackside and other subsystems	4.0	Note 7
78	Intentionally deleted			Note 6
79	SUBSET-114	KMC-ETCS Entity Off-line KM FIS	1.0.0	
80	Intentionally deleted			Note 5
81	Reserved SUBSET-119	Train Interface FFFIS		
82	Reserved SUBSET-120	FFFS TI – Safety Analysis		

Table A 2.3 - List of mandatory specifications

Index N	Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
1	Intentionally deleted			
2	Intentionally deleted			
3	SUBSET-023	Glossary of Terms and Abbreviations	3.3.0	
4	SUBSET-026	System Requirements Specification	3.6.0	
5	SUBSET-027	FIS Juridical Recording	3.3.0	
6	ERA_ERTMS_015560	ETCS Driver Machine interface	3.6.0	
7	SUBSET-034	Train Interface FIS	3.2.0	
8	SUBSET-035	Specific Transmission Module FFFIS	3.2.0	
9	SUBSET-036	FFFIS for Eurobalise	3.1.0	
10	SUBSET-037	EuroRadio FIS	3.2.0	
11	SUBSET-038	Offline key management FIS	3.1.0	
12	SUBSET-039	FIS for the RBC/RBC handover	3.2.0	
13	SUBSET-040	Dimensioning and Engineering rules	3.4.0	
14	SUBSET-041	Performance Requirements for Interoperability	3.2.0	
15	Intentionally deleted			
16	SUBSET-044	FFFIS for Euroloop	2.4.0	
17	Intentionally deleted			
18	Intentionally deleted			
19	SUBSET-047	Trackside-Trainborne FIS for Radio infill	3.0.0	
20	SUBSET-048	Trainborne FFFIS for Radio infill	3.0.0	
21	Intentionally deleted			
22	Intentionally deleted			
23	SUBSET-054	Responsibilities and rules for the assignment of values to ETCS variables	3.0.0	
24	Intentionally deleted			
25	SUBSET-056	STM FFFIS Safe time layer	3.0.0	
26	SUBSET-057	STM FFFIS Safe link layer	3.1.0	
27	SUBSET-091	Safety Requirements for the Technical Interoperability of ETCS in Levels 1 and 2	3.6.0	
28	Intentionally deleted			
29	SUBSET-102	Test specification for interface "K"	2.0.0	
30	Intentionally deleted			
31	SUBSET-094	Functional requirements for an onboard reference test facility	3.1.0	

Index N	Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
32	EIRENE FRS	GSM-R Functional requirements specification	8.0.0	Note 10
33	EIRENE SRS	GSM-R System requirements specification	16.0.0	Note 10
34	A11T6001	(MORANE) Radio Transmission FFFIS for EuroRadio	13.0.0	
35	Intentionally deleted			
36 a	Intentionally deleted			
36 b	Intentionally deleted			
36 c	SUBSET-074-2	FFFIS STM Test cases document	3.1.0	
37 a	Intentionally deleted			
37 b	SUBSET-076-5-2	Test cases related to features	3.3.0	
37 c	SUBSET-076-6-3	Test sequences	3.2.0	
37 d	SUBSET-076-7	Scope of the test specifications	3.3.0	
37 e	Intentionally deleted			
38	06E068	ETCS Marker-board definition	2.0	
39	SUBSET-092-1	ERTMS EuroRadio Conformance Requirements	3.1.0	
40	SUBSET-092-2	ERTMS EuroRadio test cases safety layer	3.1.0	
41	Intentionally deleted			
42	Intentionally deleted			
43	SUBSET 085	Test specification for Eurobalise FFFIS	3.0.0	
44	Intentionally deleted			
45	SUBSET-101	Interface "K" Specification	2.0.0	
46	SUBSET-100	Interface "G" Specification	2.0.0	
47	Intentionally deleted			
48	Reserved	Test specification for mobile equipment GSM-R		Note 4
49	SUBSET-059	Performance requirements for STM	3.1.0	
50	SUBSET-103	Test specification for Euroloop	1.1.0	
51	Intentionally deleted			
52	SUBSET-058	FFFIS STM Application layer	3.2.0	
53	Intentionally deleted			
54	Intentionally deleted			
55	Intentionally deleted			
56	Intentionally deleted			

Index N	Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
57	Intentionally deleted			
58	Intentionally deleted			
59	Intentionally deleted			
60	SUBSET-104	ETCS System Version Management	3.3.0	
61	Intentionally deleted			
62	Intentionally deleted			
63	SUBSET-098	RBC-RBC Safe Communication Interface	3.0.0	
64	EN 301 515	Global System for Mobile Communication (GSM); Requirements for GSM operation on railways	2.3.0	Note 2
65	TS 102 281	Detailed requirements for GSM operation on railways	3.0.0	Note 3
66	TS 103 169	ASCI Options for Interoperability	1.1.1	
67	(MORANE) P 38 T 9001	FFFIS for GSM-R SIM Cards	5.0	Note 10
68	ETSI TS 102 610	Railway Telecommunication; GSM; Usage of the UUIE for GSM operation on railways	1.3.0	
69	(MORANE) F 10 T 6002	FFFIS for Confirmation of High Priority Calls	5.0	
70	(MORANE) F 12 T 6002	FIS for Confirmation of High Priority Calls	5.0	
71	(MORANE) E 10 T 6001	FFFIS for Functional Addressing	4.1	
72	(MORANE) E 12 T 6001	FIS for Functional Addressing	5.1	
73	(MORANE) F 10 T6001	FFFIS for Location Dependent Addressing	4	
74	(MORANE) F 12 T6001	FIS for Location Dependent Addressing	3	
75	(MORANE) F 10 T 6003	FFFIS for Presentation of Functional Numbers to Called and Calling Parties	4	
76	(MORANE) F 12 T 6003	FIS for Presentation of Functional Numbers to Called and Calling Parties	4	
77	ERA/ERTMS/033281	Interfaces between CCS trackside and other subsystems	4.0	Note 7
78	Intentionally deleted			Note 6
79	SUBSET-114	KMC-ETCS Entity Off-line KM FIS	1.1.0	
80	Intentionally deleted			Note 5
81	Reserved	Train Interface FFFIS		
82	Reserved	FFFIS TI – Safety Analysis		
83	SUBSET-137	On-line Key Management FFFIS	1.0.0	

Note 1: only the functional description of information to be recorded is mandatory, not the technical characteristics of the interface



Note 2: the pointss of the specifications listed in point 2.1 of EN 301 515 which are referenced in Index 32 and Index 33 as “MI” are mandatory.

Note 3: the change requests (CRs) listed in table 1 and 2 of TS 102 281 which affect pointss referenced in Index 32 and Index 33 as “MI” are mandatory.

Note 4: Index 48 refers only to test cases for GSM-R mobile equipment. It is kept "reserved" for the time being. When agreed in a future revision of the TSI, the catalogue of available harmonised test cases for the assessment of mobile equipment and networks, according to the steps indicated in point 6.1.2 of this TSI, will be introduced in these tables.

Note 5: the products which are on the market are already tailored to the needs of the RU related to GSM-R Driver Machine Interface and fully interoperable so there is no need for a standard in the TSI CCS.

Note 6: information that was intended for index 78 is now incorporated in Index 27 (SUBSET-091).

Note 7: this document is ETCS and GSM-R baseline independent.

Note 8: Intentionally deleted.

Note 9: Intentionally deleted.

Note 10: Only the (MI) requirements are mandated by TSI CCS.

Note 11: Intentionally deleted.

Note 12: Intentionally deleted.

Note 13: Intentionally deleted.

Note 14: Intentionally deleted.

Table A 3 - List of mandatory standards

The application of the version of the standards listed in the table below, and their subsequent amendments when published as harmonised standard in the certification process is an appropriate means to fully comply to the risk management of the Commission Implementing Regulation (EU) No 402/2013, without prejudice for the provisions of chapter 4 and chapter 6 of this TSI.

No	Reference	Document name and comments	Version	Note
A1	EN 50126-1	Railway applications —The specification and demonstration of reliability, availability, maintainability and safety (RAMS) – Part 1: Generic RAMS Process	2017 (1999 <sup>1,2</sup> )	
A2	EN 50128	Railway applications — Communication, signalling and processing systems — Software for railway control and protection systems	2011	
A3	EN 50129	Railway applications — Communication, signalling and processing systems — Safety related electronic systems for signalling	2003	1

A4	EN 50159	Railway applications - Communication, signalling and processing systems	2010	1
A5	EN 50126-2	Railway Applications - The specification and demonstration of reliability, availability, maintainability and safety (RAMS) – Part 2: Systems Approach to Safety	2017	

Note 1: this standard is harmonised, see “Commission Communication in the framework of the implementation of the Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (recast)” (OJ C 435, 15.12.2017), where also published editorial corrigenda are indicated.

Note 2: this version of the standard may be used during the transitional period defined in the updated version of the standard. ’;

(54) the Annex G is replaced by the following:

(55) **Open Points**

Open Point	Notes
Braking aspects	It only applies to ETCS Baseline 2 (see Annex A, Table A 2, Index 15). Resolved for ETCS Baseline 3 (see Annex A, Table A 2, Indexes 4 and 13).
Reliability/ availability requirements	Frequent occurrences of degraded situations caused by failures of control-command and signalling equipment will decrease the system safety.
Characteristics of sand applied to tracks	See Annex A, Table A 2, Index 77 This is not an open point for 1520 mm.
Characteristics of flange lubricators	See Annex A, Table A 2, Index 77
Combination of rolling stock characteristics influencing shunting impedance	See Annex A, Table A 2, Index 77
Conducted interference: · Vehicle impedance · Substation impedance (for DC networks only) · Out-band limits · Interference current limits attributed to the substations and attributed to the rolling stock · Measurement, test and evaluation specification	See Annex A, Table A 2, Index 77