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COMMISSION DECISION

of 14 November 2012

concerning the technical specification for interoperability relating to the 'operation and traffic management' subsystem of the rail system in the European Union and amending Decision 2007/756/EC

(notified under document C(2012) 8075)

(Text with EEA relevance)

(2012/757/EU)

(OJ L 345, 15.12.2012, p. 1)

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(Text with EEA relevance)

(2012/757/EU)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to 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 [1], and in particular Article 6(1) thereof,

Whereas:

(1) Article 12 of Regulation (EC) No 881/2004 of the European Parliament and of the Council of 29 April 2004 establishing a European Railway Agency (Agency Regulation) [2] requires the European Railway Agency (the Agency) to ensure that the technical specifications for interoperability (TSIs) are adapted to technical progress, market trends and social requirements and to propose to the Commission the amendments to the TSIs which it considers necessary.

(2) By Decision C(2010) 2576 of 29 April 2010, the Commission gave the Agency a mandate to develop and review the technical specifications for interoperability with a view to extending their scope to the whole rail system in the Union. Under the terms of that mandate, the Agency was asked to merge and extend the scope of the high-speed TSI and the conventional rail TSI relating to the 'Traffic Operation and Management' subsystem. These TSIs were adopted respectively by Commission Decision 2008/231/EC [3], and Commission Decision 2011/314/EU [4].

(3) On 5 September 2011, the Agency issued a recommendation on the merging of the TSI on operation and traffic management for conventional rail and the TSI on operation and traffic management for high-speed rail, the extension of the geographical scope of these TSIs and the transfer of details of the European vehicle number (EVN) to Commission Decision 2007/756/EC [5].

[1] OJ L 191, 18.7.2008, p. 1.
[2] OJ L 164, 30.4.2004, p. 1.
[3] OJ L 84, 26.3.2008, p. 1.
[4] OJ L 144, 31.5.2011, p. 1.
[5] OJ L 305, 23.11.2007, p. 30.

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(4) Implementation of the TSI set out in Annex I, and conformity with the relevant points of that TSI, should be determined in accordance with an implementation plan that each Member State is required to update for the lines for which it is responsible.

(5) Rail traffic currently operates under existing national, bilateral, multinational or international agreements. It is important that those agreements do not hinder current and future progress towards interoperability. Therefore a procedure of notification of these agreements by Member States should set up.

(6) Railway vehicles are registered by the bodies that keep the national vehicle registers pursuant to Decision 2007/756/EC, based on Article 33 of Directive 2008/57/EC.

(7) The format of the European vehicle number and the requirement to have it painted on the vehicle are both necessary for identifying the vehicle and should therefore remain in the TSI on operation and traffic management.

(8) To make it easier to understand the national vehicle register and the vehicle registration processes, it is appropriate to transfer the details of the technical codes that are part of the European vehicle number to Decision 2007/756/EC. Decision 2007/756/EC should therefore be amended accordingly.

(9) Via the Committee established in accordance with Article 29 of Directive 2008/57/EC, the Commission must inform the Member States of changes in the lists of codes published by the Agency.

(10) Directive 2008/57/EC defines the ‘operation and traffic management’ subsystem as functional. Consequently, the TSI on operation and traffic management is not assessed when authorising a vehicle to be brought into service but when assessing the safety management systems of railway undertakings and infrastructure managers.

(11) For the sake of clarity and simplicity, it is appropriate not to amend the transitional provisions set out in Articles 3, 5 and 7 of Decision 2011/314/EU.

(12) Decisions 2008/231/EC and 2011/314/EU should be repealed.

(13) The measures provided for in this Decision are in conformity with the opinion of the Committee established in accordance with Article 29(1) of Directive 2008/57/EC,

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HAS ADOPTED THIS DECISION:

Article 1

1. The technical specification for interoperability (TSI) relating to the 'operation and traffic management' subsystem of the rail system in the Union, as set out in Annex I, is hereby adopted.

2. The TSI set out in Annex I to this Decision shall apply to the operation and traffic management subsystem as described in point 2.5 of Annex II to Directive 2008/57/EC.

Article 2

Member States shall notify the following types of agreement to the Commission by 30 June 2014 at the latest, provided they have not already been notified under Commission Decision 2006/920/EC ([1]), Decision 2008/231/EC or Decision 2011/314/EU:

(a) national agreements between the Member States and railway undertakings or infrastructure managers, agreed on either a permanent or a temporary basis and required by the very specific or local nature of the intended transport service;

(b) bilateral or multilateral agreements between railway undertakings, infrastructure managers or safety authorities which deliver significant levels of local or regional interoperability;

(c) international agreements between one or more Member States and at least one third country, or between railway undertakings or infrastructure managers of Member States and at least one railway undertaking or infrastructure manager of a third country, which deliver significant levels of local or regional interoperability.

Article 3

Each Member State, acting in accordance with Chapter 7 of Annex I to this Decision, shall update the national implementation plans for the TSI, established in accordance with Article 4 of Decision 2006/920/EC, Article 4 of Decision 2008/231/EC and Article 5 of Decision 2011/314/EU.

Each Member State shall forward the updated implementation plan to the other Member States and the Commission by 31 December 2014 at the latest.

([1]) OJ L 359, 18.12.2006, p. 1.

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Article 4

Decisions 2008/231/EC and 2011/314/EU are hereby repealed with effect from 1 January 2014.

Article 5

Decision 2007/756/EC is hereby amended as follows:

(a) The following Article is inserted after Article 1:

'Article 1a

Appendix 6 of the Annex of this Decision shall apply from 1 January 2014.'

(b) The Annex is amended in accordance with Annex II to this Decision.

Article 6

1. The Agency shall publish on its website the lists of codes referred in parts 9, 10, 11, 12 and 13 of Appendix 6 of the Annex to Decision 2007/756/EC.

2. The Agency shall keep the lists of codes referred to in paragraph 1 up to date and shall inform the Commission of any changes to those codes. The Commission shall inform the Member States of the evolution of these lists through the Committee established in accordance with Article 29 of Directive 2008/57/EC.

Article 7

This Decision shall apply from 1 January 2014.

Article 8

This Decision is addressed to the Member States.

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ANNEX I

TECHNICAL SPECIFICATION FOR INTEROPERABILITY FOR THE 'OPERATION AND TRAFFIC MANAGEMENT' SUBSYSTEM

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1. INTRODUCTION

1.1. **Technical scope**

This Technical Specification for Interoperability (hereinafter referred to as 'TSI') concerns the 'operation and traffic management' subsystem referred to in the list contained in point 1 of Annex II to Directive 2008/57/EC. Further information on this subsystem is provided in Chapter 2 of this Annex.

Where necessary the TSI distinguishes between requirements for conventional and high-speed rail as defined in Annex I, chapter 2.1 of Directive 2008/57/EC.

1.2. **Geographical scope**

The geographical scope of this TSI is the European rail system in accordance with Article 1 of Directive 2008/57/EC excluding the systems and networks referred to in Article 1(3) of Directive 2008/57/EC.

1.3. **Content of this TSI**

In accordance with Article 5(3) of Directive 2008/57/EC, this TSI:

(a) indicates its intended scope for the 'operation and traffic management' subsystem — Chapter 2;

(b) lays down essential requirements for the subsystem concerned and its interfaces *vis-à-vis* other subsystems — Chapter 3;

(c) establishes the functional and technical specifications to be met by the target subsystem and its interfaces *vis-à-vis* other subsystems. If necessary, these specifications may vary according to the use of the subsystem, for example according to the categories of line, hub and/or rolling stock provided for in Annex I to Directive 2008/57/EC — Chapter 4;

(d) determines the interoperability constituents and interfaces covered by European specifications, including European standards, which are necessary to achieve interoperability within the European rail system — Chapter 5;

(e) states, in each case under consideration, which procedures are to be used in order to assess the conformity or suitability for use of the interoperability constituents — Chapter 6;

(f) indicates the strategy for implementing the TSI. In particular, it is necessary to specify the stages to be completed and the elements that can be applied in order to make a gradual transition from the existing situation to the final situation in which compliance with the TSI must be the norm — Chapter 7;

(g) indicates, for the staff concerned, the professional qualifications and health and safety conditions at work required for the operation and maintenance of the subsystem concerned, as well as for the implementation of the TSI — Chapter 4.

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Moreover, in accordance with Article 5(5) of Directive 2008/57/EC, provision may be made for specific cases for each TSI. These are indicated in Chapter 7.

This TSI also comprises, in Chapter 4, the operating and maintenance rules specific to the scope indicated in points 1.1 and 1.2 of this Annex.

2. DESCRIPTION OF SUBSYSTEM/SCOPE

2.1. **Subsystem**

The 'operation and traffic management' subsystem is described in point 2.5 of Annex II to Directive 2008/57/EC as:

'The procedures and related equipment enabling coherent operation of the various structural subsystems, during both normal and degraded operation, including in particular train composition and train driving, traffic planning and management.

The professional qualifications which may be required for carrying out cross-border services.'

2.2. **Scope**

This TSI applies to the 'operation and traffic management' subsystem of infrastructure managers (hereinafter referred to as 'IM') and railway undertakings (hereinafter referred to as 'RU') related to the operation of trains on the European rail system as defined in chapter 1.2.

2.2.1. *Staff and trains*

Points 4.6 and 4.7 apply to those staff undertaking the safety-critical tasks of accompanying a train, when this involves crossing a border(s) between states and working beyond any location(s) designated as the 'frontier' in the network statement of an infrastructure manager and included in his safety authorisation.

Point 4.6.2 also applies to train drivers as stipulated by point 8 of Annex VI to Directive 2007/59/EC of the European Parliament and of the Council ([1]). A staff member will not be considered as crossing a border if the activity only involves working as far as any 'frontier' locations as described in the first paragraph of this point.

For those staff undertaking the safety-critical tasks of despatching trains and authorising train movements, mutual recognition of professional qualifications and health and safety conditions between Member States will apply.

For those staff undertaking the safety-critical tasks associated with the last preparation of a train before it is scheduled to cross a border(s) and work beyond any 'frontier' location(s) as described in the first paragraph of this point, point 4.6 will apply with mutual recognition between Member States of health and safety conditions. A train will not be considered to be a cross border service, if all the vehicles of the train crossing the state border cross it only to the 'frontier' location(s) as described in the first paragraph of this point.

([1]) OJ L 315, 3.12.2007, p. 51.

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This can be summarised in tables 1 and 2:

Table 1

Staff involved with the working of trains that will cross-state borders and proceed beyond the frontier location

Task	Professional Qualifications	Medical Requirements
Accompanying a Train	4.6	4.7
Authorising Train movements	Mutual recognition	Mutual recognition
Train Preparation	4.6	Mutual recognition
Train Despatch	Mutual recognition	Mutual recognition

Table 2

Staff working trains that do not cross state borders or do so as far as frontier locations

Task	Professional Qualifications	Medical Requirements
Accompanying a Train	Mutual recognition	Mutual recognition
Authorising Train movements	Mutual recognition	Mutual recognition
Train Preparation	Mutual recognition	Mutual recognition
Train Despatch	Mutual recognition	Mutual recognition

2.2.2. *Principles*

This TSI covers those elements (as set out in Chapter 4) of the 'operation and traffic management' subsystem, where principally there are operational interfaces between RU and IM and where there is a particular benefit to interoperability.

RU and IM must ensure that all requirements concerning rules and procedures as well as documentation are met by the establishment of the appropriate processes. The set-up of these processes is a relevant part of RU's and IM's safety management system (hereinafter referred to as 'SMS') as required by Directive 2004/49/EC of the European Parliament and of the Council [1]. The SMS itself is assessed by the relevant national safety authority (hereinafter referred to as 'NSA') before granting safety certificate/authorisation.

2.2.3. *Applicability to existing vehicles and infrastructure*

While the majority of the requirements contained in this TSI relate to processes and procedures, a number also relate to physical elements, trains and vehicles which are important for operation.

The design criteria for these elements are described in the structural TSIs covering subsystems such as rolling stock. In the context of this TSI it is their operational function that is considered.

[1] OJ L 164, 30.4.2004, p. 44.

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3. ESSENTIAL REQUIREMENTS

3.1. **Compliance with the essential requirements**

In accordance with Article 4(1) of Directive 2008/57/EC, the European rail system, its subsystems and their interoperability constituents must meet the essential requirements set out in general terms in Annex III to that Directive.

3.2. **Essential requirements — overview**

The essential requirements cover:

— safety,

— reliability and availability,

— health,

— environmental protection,

— technical compatibility.

According to Directive 2008/57/EC, the essential requirements may be generally applicable to the whole European rail system or be specific to each subsystem and its constituents.

The following table 3 summarises the correspondence between the essential requirements set out in Annex III to Directive 2008/57/EC and the present TSI.

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Table 3

Clause	Clause Title	Safety					Reliability & Availability	Health		Environmental protection					Technical compatibility	Essential requirements specific to operation and traffic management		
		1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.2	1.3.1	1.3.2	1.4.1	1.4.2	1.4.3	1.4.4	1.4.5	1.5	2.6.1	2.6.2	2.6.3
4.2.1.2	Documentation for drivers						X									X		X
4.2.1.2.1	Rule book												X			X		X
4.2.1.2.2	Route book															X		X
4.2.1.2.2.1	Preparation of the Route book															X		
4.2.1.2.2.2	Modification to Information contained within the route book															X		X
4.2.1.2.2.3	Informing the driver in real time															X	X	X
4.2.1.2.3	Timetables															X	X	X
4.2.1.2.4	Rolling stock						X									X		X
4.2.1.3	Documentation for railway undertaking staff other than drivers						X									X		X
4.2.1.4	Documentation for infrastructure manager's staff authorising train movements						X									X	X	

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Clause	Clause Title	Safety					Reliability & Availability	Health		Environmental protection					Technical compatibility	Essential requirements specific to operation and traffic management		
		1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.2	1.3.1	1.3.2	1.4.1	1.4.2	1.4.3	1.4.4	1.4.5	1.5	2.6.1	2.6.2	2.6.3
4.2.1.5	Safety-related communications between train crew, other railway undertaking staff and staff authorising train movements						X									X	X	X
4.2.2.1	Train visibility	X														X		X
4.2.2.1.1	General requirement	X														X		X
4.2.2.1.2	Front end	X														X		X
4.2.2.1.3	Rear end	X														X		X
4.2.2.2	Train audibility	X											X			X		X
4.2.2.2.1	General requirement	X														X		X
4.2.2.2.2	Control	X																X
4.2.2.3	Vehicle identification						X									X		X
4.2.2.4	Safety of passengers and load															X		
4.2.2.5	Train composition															X		
4.2.2.6	Train braking		X													X		X

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Clause	Clause Title	Safety					Reliability & Availability	Health		Environmental protection					Technical compatibility	Essential requirements specific to operation and traffic management		
		1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.2	1.3.1	1.3.2	1.4.1	1.4.2	1.4.3	1.4.4	1.4.5	1.5	2.6.1	2.6.2	2.6.3
4.2.2.6.1	Minimum requirements of the braking system		X													X		X
4.2.2.6.2	Braking performance		X													X		X
4.2.2.7	Ensuring that the train is in running order		X													X		X
4.2.2.7.1	General requirement															X		X
4.2.2.7.2	Data required															X		X
4.2.2.8	Requirements for Signal and lineside marker sighting														X	X		
4.2.2.9	Driver vigilance															X		
4.2.3.1	Train planning		X														X	X
4.2.3.2	Identification of trains															X	X	X
4.2.3.3	Train departure															X		X
4.2.3.3.1	Checks and tests before departure		X				X									X		X

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Clause	Clause Title	Safety					Reliability & Availability	Health		Environmental protection					Technical compatibility	Essential requirements specific to operation and traffic management		
		1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.2	1.3.1	1.3.2	1.4.1	1.4.2	1.4.3	1.4.4	1.4.5	1.5	2.6.1	2.6.2	2.6.3
4.2.3.3.2	Informing the Infrastructure Manager of the train's operational status		X				X										X	X
4.2.3.4	Traffic management															X	X	X
4.2.3.4.1	General requirements															X	X	X
4.2.3.4.2	Train reporting															X	X	X
4.2.3.4.2.1	Data required for train position reporting															X		X
4.2.3.4.2.2	Predicted hand over time															X		X
4.2.3.4.3	Dangerous goods															X	X	
4.2.3.4.4	Operational quality																X	X
4.2.3.5	Data recording						X										X	
4.2.3.5.1	Recording of supervision data outside the train						X										X	
4.2.3.5.2	Recording of supervision data on-board the train						X										X	
4.2.3.6	Degraded operation															X	X	X

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Clause	Clause Title	Safety					Reliability & Availability	Health		Environmental protection					Technical compatibility	Essential requirements specific to operation and traffic management		
		1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.2	1.3.1	1.3.2	1.4.1	1.4.2	1.4.3	1.4.4	1.4.5	1.5	2.6.1	2.6.2	2.6.3
4.2.3.6.1	Advice to other users															X		X
4.2.3.6.2	Advice to train drivers															X		
4.2.3.6.3	Contingency arrangements															X	X	X
4.2.3.7	Managing an emergency situation															X	X	X
4.2.3.8	Aid to train crew in the event of an incident or of a major rolling stock malfunction																	X
4.4	Operating rules															X	X	
4.6	Professional qualifications															X	X	X
4.7	Health and safety conditions															X		

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4. CHARACTERISTICS OF THE SUBSYSTEM

4.1. **Introduction**

Taking into account all the relevant essential requirements, the 'operation and traffic management' subsystem, as described in point 2.2, covers only the elements specified in this Chapter.

In conformity with Directive 2001/14/EC of the European Parliament and of the Council [1], it is the overall responsibility of the infrastructure manager to provide all the appropriate requirements which must be met by trains permitted to run on its network, taking into account the geographic particularities of individual lines and the functional or technical specifications set out in this Chapter.

4.2. **Functional and technical specifications of the subsystem**

The functional and technical specifications of the 'operation and traffic management' subsystem comprise of the following:

— specifications relating to staff,

— specifications relating to trains,

— specifications relating to train operations.

4.2.1. *Specifications relating to staff*

4.2.1.1. General requirements

This point deals with staff who contributes to the operation of the subsystem by performing safety-critical tasks involving a direct interface between a railway undertaking and an infrastructure manager.

(1) Railway undertaking staff:

(a) undertaking the task of driving trains (referred to throughout this TSI as 'driver') and forming part of the 'train crew',

(b) undertaking tasks on-board (other than driving) and forming part of the 'train crew',

(c) undertaking the task of preparing trains.

(2) Infrastructure manager's staff undertaking the task of authorising the movement of trains

The areas covered are:

— Documentation

— Communication

In addition, for the staff as defined in point 2.2.1., this TSI sets out requirements on:

[1] OJ L 75, 15.3.2001, p. 29.

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— Qualifications (see point 4.6 and Appendix L)

— Health and safety conditions (see point 4.7)

4.2.1.2. Documentation for drivers

The railway undertaking operating the train must supply the driver with all the necessary information and documentation required to carry out his duties.

This information must take into account the necessary elements for operation in normal, degraded and emergency situations for the routes to be worked over and the rolling stock used on those routes.

4.2.1.2.1. Driver's Rule Book

All the necessary procedures for the driver must be included in a document or a computer medium called the 'Driver's Rule Book'.

The Driver's Rule Book must state the requirements for all the routes worked and the rolling stock used on those routes according to the situations of normal operation, degraded operation and in emergency situations which the driver may encounter.

The Driver's Rule Book must cover two distinct aspects:

— one which describes the set of common rules and procedures (taking into account the contents of Appendices A, B and C),

— another which sets out any necessary rules and procedures specific to each infrastructure manager.

It must include procedures covering, as a minimum, the following aspects:

— Staff safety and security,

— Signalling and control-command,

— Train operation including degraded mode,

— Traction and rolling stock,

— Incidents and accidents.

The railway undertaking is responsible for compiling the Driver's Rule Book.

The railway undertaking must present the Driver's Rule Book in the same format for the entire infrastructure over which their drivers will work.

The railway undertaking must compile the Driver's Rule Book in such a way that the driver's application of all operational rules is enabled.

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It must have two appendices:

— Appendix 1: Manual of communication procedures;

— Appendix 2: Book of Forms.

Predefined messages and forms must remain in the 'operating' language of infrastructure manager(s).

The process for preparing and updating the Driver's Rule Book must include the following steps:

— the infrastructure manager (or the organisation responsible for the preparation of the operating rules) must provide the railway undertaking with the appropriate information in the infrastructure manager's operating language,

— the railway undertaking must draw up the initial or updated document;

— if the language chosen by the railway undertaking for the Driver's Rule Book is not the language in which the appropriate information was originally supplied, it is the responsibility of the railway undertaking to arrange for any necessary translation and/or provide explanatory notes in another language.

The infrastructure manager must ensure that the content of the documentation provided to the railway undertaking(s) is complete and accurate.

The railway undertaking must ensure that the content of the Driver's Rule Book is complete and accurate.

4.2.1.2.2. Description of the line and the relevant line-side equipment associated with the lines worked over

Drivers must be provided with a description of the lines and the associated line-side equipment for the lines over which they will operate and relevant to the driving task. Such information must be set out in a single document called the 'Route Book' (which can either be a traditional document or computer based).

The following is a list of information which must, as a minimum, be provided:

— the general operating characteristics,

— indication of rising and falling gradients,

— detailed line diagram.

4.2.1.2.2.1. Preparation of the Route Book

The format of the Route Book must be prepared in the same manner for all the infrastructures worked over by the trains of an individual railway undertaking.

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The railway undertaking is responsible for the complete and correct compilation of the Route book (for example, arranging for any necessary translation and/or providing explanatory notes), using the information supplied by the infrastructure manager(s).

The following information must be included (this list is not exhaustive):

(a) the general operating characteristics:

— type of signalling and corresponding running regime (double track, reversible working, left or right hand running, etc.),

— type of power supply,

— type of ground-train radio equipment.

(b) indication of rising and falling gradients with their gradient values and location;

(c) detailed line diagram:

— names of stations on the line and key locations and their location;

— tunnels, including location, name, length, specific information such as the existence of walkways and points of safe egress as well as the location of safe places where evacuation of passengers can take place

— essential locations such as neutral sections

— permissible speed limits for each track, including, if necessary, differential speeds relating to certain types of train,

— the responsible infrastructure manager

— means of communication with the traffic management/control centre in normal and degraded mode

The infrastructure manager must ensure that the content of the documentation provided to the railway undertaking(s) is complete and accurate.

The railway undertaking must ensure that the content of the Route Book is complete and accurate.

4.2.1.2.2.2. Modifications to information contained within the Route Book

The infrastructure manager must advise the railway undertaking of any permanent or temporary modifications to information supplied in accordance with point 4.2.1.2.2.1.

These changes must be grouped by the railway undertaking into a dedicated document or computer medium whose format must be the same for all the infrastructures worked over by the trains of an individual railway undertaking.

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The infrastructure manager must ensure that the content of the documentation provided to the railway undertaking(s) is complete and accurate.

The railway undertaking must ensure that the content of the document grouping the modifications to information contained within the Route book is complete and accurate.

4.2.1.2.2.3. Informing the driver in real time

The infrastructure manager must inform drivers of any changes to the line or relevant lineside equipment that have not been advised as modifications to information for the Route Book as set out in point 4.2.1.2.2.2.

4.2.1.2.3. Timetables

The provision of train schedule information facilitates the punctual running of trains and assists in service performance.

The railway undertaking must provide drivers with the information necessary for the normal running of the train and as a minimum include:

— the train identification;

— the train running days (if necessary);

— the stopping points and the activities associated with them

— other timing points;

— the arrival/departure/passing times at each of those points.

Such train running information, which must be based on information supplied by the infrastructure manager, may be provided either electronically or in a paper format.

Presentation to the driver must be consistent across all the lines over which the railway undertaking operates.

4.2.1.2.4. Rolling stock

The railway undertaking must provide the driver with all information relevant to the working of the rolling stock during degraded situations (such as trains requiring assistance). Such documentation must also focus on the specific interface with the infrastructure manager's staff in these cases.

4.2.1.3. Documentation for railway undertaking staff other than drivers

The railway undertaking must provide all members of his staff (whether on train or otherwise) who undertake safety-critical tasks involving a direct interface with the staff, equipment or systems of the infrastructure manager with the rules, procedures, rolling stock and route specific information it deems appropriate to such tasks. Such information shall be applicable in both normal and degraded operation.

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For staff on-board trains, the structure, format, content and process for preparation and updating of such information must be based on the specification set out in Subsection 4.2.1.2 of this TSI.

4.2.1.4. Documentation for infrastructure manager's staff authorising train movements

All the information necessary to ensure safety-related communication between staff authorising the movement of trains and train crews must be set out in:

— documents describing the Communications Principles (Appendix C);

— the document entitled Book of forms.

The infrastructure manager must draw up these documents in his operating language.

4.2.1.5. Safety-related communications between train crew, other railway undertaking staff and staff authorising train movements

The language used for safety-related communication between train crew, other railway undertaking staff (as defined in Appendix L) and the staff authorising train movements is the operating language (see glossary) used by the infrastructure manager on the route concerned.

The principles for safety-related communication between train crew and staff responsible for authorising the movement of trains are to be found in Appendix C.

In conformity with Directive 2001/14/EC, the infrastructure manager is responsible for publishing the 'operating' language used by his personnel in daily operational use.

Where, however, local practice requires that a second language is also provided for, it is the responsibility of the infrastructure manager to determine the geographic boundaries for its use.

4.2.2. *Specifications relating to trains*

4.2.2.1. Train visibility

4.2.2.1.1. General requirement

The railway undertaking must ensure that trains are fitted with means of indicating the front and rear of the train.

4.2.2.1.2. Front end

The railway undertaking must ensure that an approaching train is clearly visible and recognisable as such, by the presence and layout of its lit white front-end lights.

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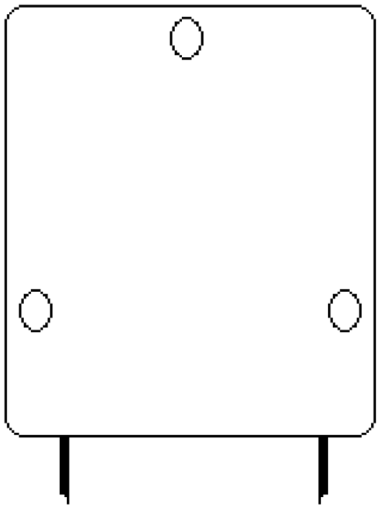
The forward facing front-end of the leading vehicle of a train must be fitted with three lights in an isosceles triangle, as shown below. These lights must always be lit when the train is being driven from that end.

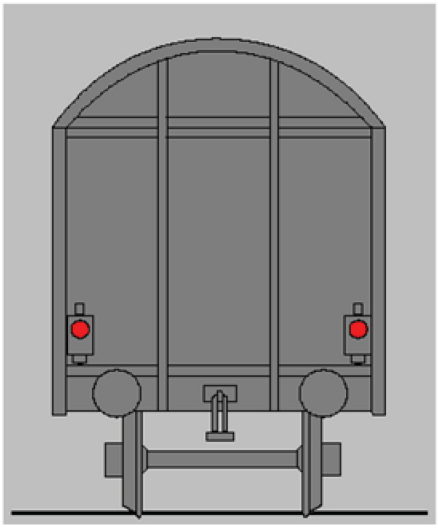


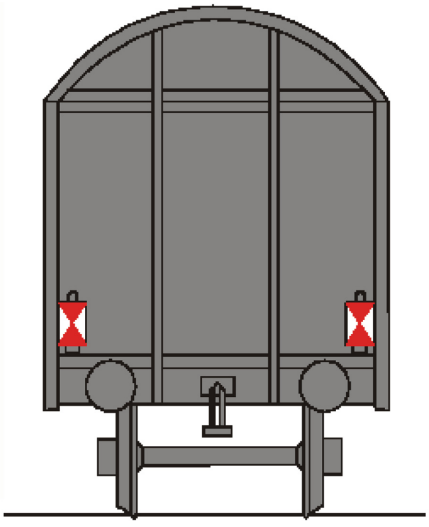
The front lights must optimise train detectability (for example, to track workers and those using public crossings) (marker lights), provide sufficient visibility for the train driver (illumination of the line ahead, lineside information markers/boards, etc.) (head lights) by night and during low light conditions and must not dazzle the drivers of oncoming trains.

The spacing, the height above rails, the diameter, the intensity of the lights, the dimensions and shape of the emitted beam in both day and night time operation are defined in the rolling stock TSI(hereinafter referred to as 'RST TSI').

4.2.2.1.3. Rear end

The railway undertaking must provide the required means of indicating the rear of a train. The rear end signal must only be exhibited on the rear of the last vehicle of the train. It must be displayed as shown below.





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4.2.2.1.3.1. Passenger trains

The rear end indication of a passenger train must consist of 2 steady red lights at the same height above buffer on the transversal axis.

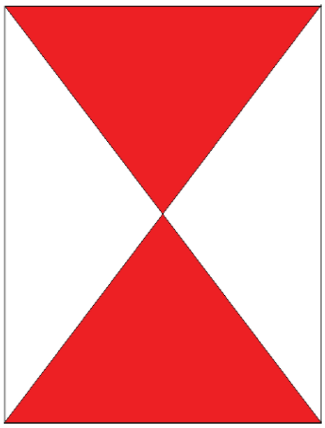
4.2.2.1.3.2. Freight trains in international traffic

The Member State must notify which of the following requirements will apply on the network of its Member State for trains that cross a border between Member States:

Either

— 2 steady red lights, or

— 2 reflective plates of the following shape with white side triangles and red top and bottom triangle:



The lamps or plates must be on the same height above buffer on the transversal axis. Member States that require 2 reflective plates must also accept 2 steady red lights as train rear end indication.

4.2.2.1.3.3. Freight trains not crossing a border between Member States

For freight trains not crossing a border between Member States the train rear end indication is an open point (see Appendix U).

4.2.2.2. Train audibility

4.2.2.2.1. General requirement

The railway undertaking must ensure that trains are fitted with an audible warning device to indicate the approach of a train.

4.2.2.2.2. Control

The activation of the audible warning device must be possible from all driving positions.

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4.2.2.3. Vehicle identification

Each vehicle must have a European Vehicle number to uniquely identify it from any other rail vehicle. This number must be prominently displayed at least on each longitudinal side of the vehicle as specified in Appendix P.

The European Vehicle Number consists of 12 digits; further details are set out in the Decision 2007/756/EC.

It must also be possible to identify operational restrictions applicable to the vehicle.

4.2.2.4. Safety of passengers and load

4.2.2.4.1. Safety of load

The railway undertaking must make sure that freight vehicles are safely and securely loaded and remain so throughout the journey.

4.2.2.4.2. Safety of passengers

The railway undertaking must ensure that passenger transport is undertaken safely at the departure and during the journey.

4.2.2.5. Train composition

The railway undertaking must define the rules and procedures to be followed by his staff so as to ensure that the train is in compliance with the allocated path.

Train composition requirements must take into account the following elements:

(a) the vehicles

— all vehicles in the train must be in compliance with all the requirements applicable on the routes over which the train will run;

— all vehicles on the train must be fit to run at the maximum speed at which the train is scheduled to run;

— all vehicles on the train must be currently within their specified maintenance interval and will remain so for the duration (in terms of both time and distance) of the journey being undertaken;

(b) the train

— the combination of vehicles forming a train must comply with the technical constraints of the route concerned and be within the maximum length permissible for forwarding and receiving terminals.

— the railway undertaking is responsible for ensuring that the train is technically fit for the journey to be undertaken and remains so throughout the journey

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(c) the weight and axle load

— the weight of the train must be within the maximum permissible for the section of route, the strength of the couplings, the traction power and other relevant characteristics of the train. Axle load limitations must be respected.

(d) the maximum speed of the train

— the maximum speed at which the train can run must take into account any restrictions on the route(s) concerned, braking performance, axle load and vehicle type.

(e) the kinematic envelope

— the kinematic gauge of each vehicle (inclusive of any load) in the train must be within the maximum permissible for the section of route.

Additional constraints may be required or imposed due to the type of braking regime or traction type on a particular train.

4.2.2.6. Train braking

4.2.2.6.1. Minimum requirements of the braking system

All vehicles in a train must be connected to the continuous automatic braking system as defined in the TSI Rolling Stock (Commission Decisions 2006/861/EC ([1]), 2008/232/EC ([2]) and 2011/291/EU ([3])).

The first and last vehicles (including any traction units) in any train must have the automatic brake operative.

In the case of a train becoming accidentally divided into two parts, both sets of detached vehicles must come automatically to a stand as a result of a maximum application of the brake.

4.2.2.6.2. Braking performance

The infrastructure manager must provide the railway undertaking with the actual performance required. This data shall include, if necessary, conditions of use of braking systems possibly affecting the infrastructure such as magnetic, regenerative and eddy-current brake.

The railway undertaking is responsible for ensuring that the train has sufficient braking performance by providing braking rules for its staff to be followed.

The rules concerning braking performance have to be managed within the infrastructure manager's and railway undertaking's safety management system.

Further requirements are specified in Appendix T.

([1]) OJ L 344, 8.12.2006, p. 1.
([2]) OJ L 84, 26.3.2008, p. 132.
([3]) OJ L 139, 26.5.2011, p. 1.

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4.2.2.7. Ensuring that the train is in running order

4.2.2.7.1. General requirement

The railway undertaking must define the process to ensure that all safety-related on-train equipment is in a fully functional state and that the train is safe to run.

The railway undertaking must inform the infrastructure manager of any modification to the characteristics of the train affecting its performance or any modification that might affect the ability to accommodate the train in its allocated path.

The infrastructure manager and the railway undertaking must define and keep up to date conditions and procedures for train running in degraded mode.

4.2.2.7.2. Data required

The data required for safe and efficient operation and the process by which this data must be forwarded must comprise:

— the train identification

— the identity of the railway undertaking responsible for the train

— the actual length of the train

— if a train carries passengers or animals when it is not scheduled to do so

— any operational restrictions with an indication of the vehicle(s) concerned (gauge, speed restrictions, etc.)

— information the infrastructure manager requires for the transport of dangerous goods.

The railway undertaking must ensure that this data is made available to the infrastructure manager(s) prior to the departure of the train.

The railway undertaking must advise the infrastructure manager(s) if a train will not occupy its allocated path or is cancelled.

4.2.2.8. Requirements for lineside signal and marker sighting

The driver must be able to observe lineside signals and markers, and they must be observable by the driver in the situations where the driver needs to respect the signals and markers. The same applies for other types of lineside signs if they are safety related.

Driving cabs must be designed in such a consistent way that the driver is able to easily see the relevant information displayed to him.

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4.2.2.9. Driver vigilance

A means of onboard monitoring of driver vigilance is necessary. This shall intervene to bring the train to a stand if the driver does not react within a certain time; the time range is specified in the rolling stock TSIs.

4.2.3. *Specifications relating to train operations*

4.2.3.1. Train planning

In accordance with Directive 2001/14/EC the infrastructure manager must advise what data is required when a train path is requested.

4.2.3.2. Identification of trains

Each train must be identified by a train running number. The train running number is given by the infrastructure manager when allocating a train path and must be known by the railway undertaking and all infrastructure managers operating the train. The train running number must be unique per network. Changes of train running number during a train journey should be avoided.

4.2.3.2.1. Format of train running number

The train running number format is defined in the Commission Decision 2012/88/EU of 25 January 2012 on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system [1] (hereinafter referred to as 'CCS TSI').

4.2.3.3. Train departure

4.2.3.3.1. Checks and tests before departure

The railway undertaking must define the checks and tests to ensure that any departure is undertaken safely (e.g. doors, load, brakes).

4.2.3.3.2. Informing the infrastructure manager of the train's operational status

The railway undertaking shall inform the infrastructure manager when a train is ready for access to the network.

The railway undertaking must inform the infrastructure manager of any anomaly affecting the train or its operation having possible repercussions on the train's running prior to departure and during the journey.

4.2.3.4. Traffic management

4.2.3.4.1. General requirements

Traffic management must ensure the safe, efficient and punctual operation of the railway, including effective recovery from service disruption.

The infrastructure manager must determine procedures and means for:

[1] OJ L 51, 23.2.2012, p. 1.

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— the real time management of trains,

— operational measures to maintain the highest possible performance of the infrastructure in case of delays or incidents, whether actual or anticipated, and

— the provision of information to the railway undertaking(s) in such cases.

Any additional processes required by the railway undertaking and which affect the interface with the infrastructure manager(s) can be introduced after being agreed with the infrastructure manager.

4.2.3.4.2. Train reporting

4.2.3.4.2.1. Data required for train position reporting

The infrastructure manager must:

(a) provide a means of real time recording of the times at which trains depart from, arrive at or pass appropriate pre-defined reporting points on their networks and the delta-time value;

(b) provide the specific data required in relation to train position reporting. Such information must include:

— Train identification

— Identity of reporting point

— Line on which the train is running

— Scheduled time at reporting point

— Actual time at reporting point (and whether depart, arrive or pass — separate arrival and departure times must be provided in respect of intermediate reporting points at which the train calls)

— Number of minutes early or late at the reporting point

— Initial explanation of any single delay exceeding 10 minutes or as otherwise required by the performance monitoring regime

— Indication that a report for a train is overdue and the number of minutes by which it is overdue

— Former train identification(s), if any

— Train cancelled for a whole or a part of its journey.

4.2.3.4.2.2. Predicted hand over time

The infrastructure manager must have a process, which enables an indication of the estimated number of minutes of deviation from the scheduled time a train is scheduled to be handed over from one infrastructure manager to another.

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This must include information on service disruption (description and location of problem).

4.2.3.4.3. Dangerous goods

The railway undertaking must define the procedures to supervise the transport of dangerous goods.

These procedures must include:

— the provisions as specified in Directive 2008/68/EC of the European Parliament and of the Council [1];

— advice to the driver of the presence and position of dangerous goods on the train;

— information the infrastructure manager requires for transport of dangerous goods;

— determination, in conjunction with the infrastructure manager, of lines of communication and planning of specific measures in case of emergency situations involving the goods.

4.2.3.4.4. Operational quality

The infrastructure manager and the railway undertaking must have processes in place to monitor the efficient operation of the all the services concerned.

Monitoring processes must be designed to analyse data and detect underlying trends, both in terms of human error and system error. The results of this analysis must be used to generate improvement actions, designed to eliminate or mitigate against events which could compromise the efficient operation of the network.

Where such improvement actions would have network-wide benefits, involving other infrastructure managers and railway undertakings, they must, subject to commercial confidentiality, be communicated accordingly.

Events that have significantly disrupted operations must be analysed as soon as possible by the infrastructure manager. Where appropriate, and in particular where one of their staff is concerned, the infrastructure manager must invite those railway undertaking(s) involved in the event concerned to participate in the analysis. Where the result of such analysis leads to network improvement recommendations designed to eliminate or mitigate against causes of accidents/incidents, these must be communicated to all relevant infrastructure managers and railway undertakings concerned.

These processes shall be documented and subject to internal audit.

[1] OJ L 260, 30.9.2008, p. 13.

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4.2.3.5. Data recording

Data pertaining to the running of a train must be recorded and retained for the purposes of:

— supporting systematic safety monitoring as a means of preventing incidents and accidents;

— identifying driver, train and infrastructure performance in the period leading up to and (if appropriate) immediately after an incident or accident, to enable the identification of causes related to train driving or train equipment, and supporting the case for new or changed measures to prevent recurrence;.

— recording information relating to the performance of both the locomotive/traction unit and the person driving.

It must be possible to match recorded data to:

— the date and time of the recording;

— the precise geographic location of the event being recorded (distance in kilometres from a recognisable location);

— the train identification;

— the identity of the driver.

Requirements with regard to storage, periodic evaluation of and access to this data are specified in relevant national laws of the Member State:

— in which the railway undertaking is licensed (with regard to on-board recorded data), or

— of the Member State in which the infrastructure is located (with regard to data recorded outside the train).

4.2.3.5.1. Recording of supervision data outside the train

As a minimum, the infrastructure manager must record the following data:

— the failure of line-side equipment associated with the movement of trains (signalling, points etc.);

— the detection of an overheating axle bearing, where this equipment is provided;

— communication between the train driver and infrastructure manager's staff authorising train movements.

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4.2.3.5.2. Recording of supervision data on-board the train

As a minimum, the railway undertaking must record the following data:

— the passing of signals at danger or 'end of movement authority' without authority;

— application of the emergency brake;

— speed at which the train is running;

— any isolation or overriding of the on-board train control (signalling) systems;

— operation of the audible warning device (horn);

— operation of door controls (release, closure);

— detection by on-board hot axle box detectors, if fitted;

— identity of the cab for which data is being recorded to be checked.

4.2.3.6. Degraded operation

4.2.3.6.1. Advice to other users

The infrastructure manager in conjunction with the railway undertaking(s) must define a process to immediately inform each other of any situation that impedes the safety, performance and/or the availability of the rail network or rolling stock.

4.2.3.6.2. Advice to train drivers

In any case of degraded operation associated with the infrastructure manager's area of responsibility, the infrastructure manager must give formal instructions to drivers on what measures to take in order to safely overcome the degradation.

4.2.3.6.3. Contingency arrangements

The infrastructure manager in conjunction with all the railway undertakings operating over his infrastructure, and neighbouring infrastructure managers as appropriate, must define, publish and make available appropriate contingency measures and assign responsibilities based on the requirement to reduce any negative impact as a result of degraded operation.

The planning requirements and the response to such events must be proportional to the nature and potential severity of the degradation.

These measures, which must as a minimum include plans for recovering the network to 'normal' status, may also address:

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— rolling stock failures (for example, those which could result in substantial traffic disruption, the procedures for rescuing failed trains);

— infrastructure failures (for example, when there has been a failure of the electric power or the conditions under which trains may be diverted from the booked route);

— extreme weather conditions.

The infrastructure manager must establish and keep updated contact information for key infrastructure manager and railway undertaking staff who may be contacted in the event of service disruption leading to degraded operation. This information must include contact details both during and outside office hours.

The railway undertaking must submit this information to the infrastructure manager and advise the infrastructure manager of any changes to these contact details.

The infrastructure manager must advise all the railway undertaking(s) of any changes to his details.

4.2.3.7. Managing an emergency situation

The infrastructure manager must, in consultation with:

— all railway undertakings operating over his infrastructure, or, where appropriate, representative bodies of railway undertakings operating over his infrastructure;

— neighbouring infrastructure managers, as appropriate;

— local authorities, representative bodies of the emergency services (including fire fighting and rescue) at either local or national level, as appropriate.

define, publish and make available appropriate measures to manage emergency situations and restore the line to normal operation.

Such measures shall typically cover:

— collisions,

— fires on train,

— evacuation of trains,

— accidents in tunnels,

— incidents involving dangerous goods,

— derailments.

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The railway undertaking must provide the infrastructure manager with any specific information in respect to these circumstances, especially in respect to the recovery or re-railing of their trains.

Additionally, the railway undertaking must have processes to inform passengers about on-board emergency and safety procedures.

4.2.3.8. Aid to train crew in the event of an incident or of a major rolling stock malfunction

The railway undertaking must define appropriate procedures to assist the train crew in degraded situations in order to avoid or decrease delays caused by technical or other failures of the rolling stock (for example, lines of communication, measures to be taken in case of evacuation of a train).

4.3. **Functional and technical specifications of the interfaces**

In the light of the essential requirements set out in Chapter 3, the functional and technical specifications of the interfaces are as follows:

4.3.1. *Interfaces with the infrastructure TSIs*

Reference operation TSI		Reference conventional rail infrastructure TSI	
Parameter	Point	Parameter	Point
Braking performance	4.2.2.6.2	Longitudinal track resistance	4.2.7.2
Modifications to information contained in the route book	4.1.2.2.2	Operating rules	4.4
Degraded operation	4.2.3.6		

Reference operation TSI		Reference high speed rail infrastructure TSI	
Parameter	Point	Parameter	Point
Staff and trains	2.2.1	Professional competences	4.6

4.3.2. *Interfaces with the control-command and signalling TSI*

Reference operation TSI		Reference control-command and signalling TSI	
Parameter	Point	Parameter	Point
Rule book	4.2.1.2.1	Track-side train detection systems	4.2.10
Operating rules	4.4	Operating rules	4.4
Signal and lineside marker sighting	4.2.2.8	Visibility of track-side control-command and signalling objects	4.2.15

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Reference operation TSI		Reference control-command and signalling TSI	
Parameter	Point	Parameter	Point
Braking performance	4.2.2.6	Train braking performance and characteristics	4.2.2
Train running number	4.2.3.2.1	ETCS DMI	4.2.12
		GSM-R DMI	4.2.13
Data recording on-board	4.2.3.5	Interface to data recording for regulatory purposes	4.2.14

4.3.3. *Interfaces with the rolling stock TSI*

4.3.3.1. Interfaces with TSI on locomotives and passenger rolling stock TSI

Reference operation TSI		Reference conventional rail locom. and pass. TSI	
Parameter	Point	Parameter	Point
Contingency arrangements	4.2.3.6.3	Rescue coupling	4.2.2.2.4
Train composition	4.2.2.5	Interface with infrastructure: axle load and wheel load	4.2.3.2
Minimum requirements of the braking system	4.2.2.6.1	Braking performance	4.2.4.5
Train visibility	4.2.2.1	External lights	4.2.7.1
Train audibility	4.2.2.2	Horn	4.2.7.2
Signal sighting	4.2.2.8	External visibility	4.2.9.1.3
		Optical characteristics of the windscreen	4.2.9.2.2
		Internal lighting	4.2.9.1.8
Driver vigilance	4.2.2.9	Driver's activity control function	4.2.9.3.1
Data recording	4.2.3.5.2	Recording device	4.2.9.6

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4.3.3.2. Interfaces with TSI on freight wagons

Reference operation TSI		Reference conventional freight wagon TSI	
Parameter	Point	Parameter	Point
Rear end	4.2.2.1.3.2	Attachment devices for rear-end signal	4.2.6.3
Rear end	4.2.2.1.3.2	Rear-end signal	Annex E
Train composition	4.2.2.5	Gauging	4.2.3.1
Train composition	4.2.2.5	Compatibility with load carrying capacity of lines	4.2.3.2
Contingency arrangements	4.2.3.6.3	Lifting and jacking	4.2.2.2
Train braking	4.2.2.6	Brake	4.2.4

4.3.3.3. Interfaces with TSI on high-speed rolling stock

Reference operation TSI		Reference high speed rolling stock TSI	
Parameter	Point	Parameter	Point
Train composition	4.2.2.5	Minimum braking performance	4.2.4.1
Minimum requirements of the braking system	4.2.2.6.1	Brake system requirements	4.2.4.3
Braking performance	4.2.2.6.2		
Braking performance	4.2.2.6.2	Eddy current brakes	4.2.4.5
Braking performance	4.2.2.6.2	Protection of an immobilised train	4.2.4.6
Braking performance	4.2.2.6.2	Brake performance on steep gradients	4.2.4.7
Informing the driver in real time	4.2.1.2.2.3		
Requirements for passenger vehicles	4.2.2.4	Access	4.2.2.4
		Passenger alarm	4.2.5.3
		Emergency exits	4.2.7.1
Front end	4.2.2.1.2	Front and rear lights	4.2.7.4.1
Rear end	4.2.2.1.3	Front and rear lights	4.2.7.4.1

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Reference operation TSI		Reference high speed rolling stock TSI	
Parameter	Point	Parameter	Point
Train audibility	4.2.2.2	horns	4.2.7.4.2
Signal sighting and lineside marker sighting	4.2.2.8	Windscreen and front of the train	4.2.2.7
Driver vigilance	4.2.2.9	Driver's vigilance device	4.2.7.8
Train composition Contingency arrangements Managing and emergency situation	4.2.2.5 4.2.3.6.3 4.2.3.7	End couplers and coupling arrangements to rescue trains Coupler Maximum train length	4.2.2.2 Annex K 4.2.3.5
Degraded operation	4.2.3.6	Axle bearing health monitoring Rolling stock dynamic behaviour	4.2.3.3.2 4.2.3.4
Sanding	Appendix B (C1)	sanding	4.2.3.10
Train crew knowledge of rolling stock functionality	4.2.2.5 Appendix J	Design of train Monitoring and diagnostic concepts	4.2.1.2 4.2.7.10
Contingency arrangements Managing an emergency situation	4.2.3.6.3 4.2.3.7	End couplers and coupling arrangements to rescue trains coupler	4.2.2.2 Annex K
Degraded operation Managing an emergency situation	4.2.3.6 4.2.3.7	Emergency measures Fire safety	4.2.7.1 4.2.7.2
Recording of supervision data on-board the train	4.2.3.5.2	Monitoring and diagnostic concepts	4.2.7.10
Informing the driver in real time	4.2.1.2.2.3	Ballast pick up	4.2.3.11
Train composition Informing the Infrastructure Manager of the train's operational status	4.2.2.5 4.2.3.3.2.	Environmental conditions	4.2.6.1
Informing the driver in real time Degraded operation	4.2.1.2.2.3 4.2.3.6	Crosswind	4.2.6.3

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Reference operation TSI		Reference high speed rolling stock TSI	
Parameter	Point	Parameter	Point
Informing the driver in real time	4.2.1.2.2.3	Maximum pressure variations in tunnels	4.2.6.4
Degraded operation	4.2.3.6		
Managing an emergency situation	4.2.3.7	Exterior noise	4.2.6.5
Managing an emergency situation	4.2.3.7	Fire safety	4.2.7.2
Managing an emergency situation	4.2.3.7	Lifting/rescue procedures	4.2.7.5
Recording of supervision data on-board the train	4.2.3.5.2	Particular specification for tunnels	4.2.7.11
		Appendix J	
Preparation of the route book	4.2.1.2.2.1	Emergency lighting systems	4.2.7.12
Managing an emergency situation	4.2.3.7		
Auxiliary staff	4.6.3.2.3.3		
Train composition	4.2.2.5	Traction performance requirements	4.2.8.1
Informing the Infrastructure Manager of the train's operational status	4.2.3.3.2		
Informing the Infrastructure Manager of the train's operational status	4.2.3.3.2	Traction wheel/rail adhesion requirements	4.2.8.2
Degraded operation	4.2.3.6		
Description of the line and relevant lineside equipment associated with the lines worked over	4.2.1.2.2		
Degraded operation	4.2.3.6	Functional and technical specification related to the electric power supply	4.2.8.3
Description of the line and relevant lineside equipment associated with the lines worked over	4.2.1.2.2		

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4.3.4. *Interfaces with the Energy TSI*

Reference operation TSI		Reference conventional rail energy TSI	
Parameter	Point	Parameter	Point
Description of the line and the relevant lineside equipment associated with the lines worked over	4.2.1.2.2	Management of power supply	4.4.2
Informing the driver in real time	4.2.1.2.2.3		
Modifications to information contained within the route book	4.2.1.2.2.2	Execution of works	4.4.3

Reference operation TSI		Reference high speed rail energy TSI	
Parameter	Point	Parameter	Point
Staff and trains	2.2.1	Professional competences	4.6

4.4. **Operating rules**

The rules and procedures enabling coherent operation of new and different structural subsystems intended to be used in the European rail system, and in particular those that are linked directly to the operation of a new control-command and signalling system, must be identical where identical situations exist.

To this end, the operating rules for the European Rail Traffic Management System (ERTMS/ETCS) and for ERTMS/GSM-R radio system are specified in Appendix A.

Other operating rules, which are able to be standardised across the European rail system, will be specified in Appendix B.

4.5. **Maintenance rules**

Not applicable.

4.6. **Professional qualifications**

In accordance with point 2.2.1 of this TSI, this point deals with professional and linguistic competency and the assessment process required for staff to attain this competency.

4.6.1. *Professional competency*

Staff of the railway undertaking and the infrastructure manager must have attained appropriate professional competency to undertake all necessary safety-related duties in normal, degraded and emergency situations. Such competency comprises professional knowledge and the ability to put this knowledge into practice.

Minimum elements relevant to professional qualification for individual tasks can be found in Appendices J and L.

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4.6.1.1. Professional knowledge

Taking these appendices into account and dependant on the duties of the individual staff member concerned, the knowledge required will comprise the following:

(a) general railway operation with particular emphasis on safety-critical activity:

— principles of operation of their organisation's safety management system;

— the roles and responsibilities of the key players involved in interoperable operations;

— appreciation of hazards, especially in relation to the risks involving railway operation and electric traction supply.

(b) appropriate knowledge of safety-related tasks in respect to procedures and interfaces for:

— lines and line-side equipment;

— rolling stock;

— the environment.

4.6.1.2. Ability to put this knowledge into practice

The ability to apply this knowledge in routine, degraded and emergency situations will require staff to be fully acquainted with:

— the method and principles for applying these rules and procedures;

— the process for the use of line-side equipment and rolling stock, as well as any specific safety-related equipment;

— the principles of the safety management system to avoid the introduction of any undue risk to people and process.

Staff must also possess a general ability to adapt to the different circumstances an individual may encounter.

Railway undertakings and infrastructure managers are required to establish a competence management system to ensure that the individual competency of their staff involved is assessed and maintained. Additionally, training must be provided, as necessary, to ensure that knowledge and skills are kept up to date, especially in relation to weaknesses or deficiencies in system or individual performance.

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4.6.2. *Linguistic competency*

4.6.2.1. Principles

The infrastructure manager and the railway undertaking are required to ensure that their relevant personnel are competent in the use of the communication protocols and principles set out in this TSI.

Where the operating language used by the infrastructure manager differs from that habitually used by the railway undertaking's personnel, such linguistic and communications training must form a critical part of the railway undertaking's overall competency management system.

Railway undertaking staff whose duties require them to communicate with staff of the infrastructure manager in connection with safety-critical matters, whether in routine, degraded or emergency situations, must have a sufficient level of knowledge in the operating language of the infrastructure manager.

4.6.2.2. Level of knowledge

The level of knowledge in the infrastructure manager's language must be sufficient for safety purposes.

(a) As a minimum this must comprise of the driver being able to:

— send and understand all the messages specified in Appendix C to this TSI;

— effectively communicate in routine, degraded and emergency situations;

— complete the forms associated with the use of the Book of Forms;

(b) Other members of the train crew whose duties require them to communicate with the infrastructure manager on safety-critical matters, must as a minimum, be able to send and understand information describing the train and its operational status.

Guidance on the appropriate levels of competency is defined in Appendix E. The level of knowledge for drivers must be at least level 3. The level of knowledge for staff accompanying trains must be at least level 2.

4.6.3. *Initial and on-going assessment of staff*

4.6.3.1. Basic elements

Railway undertakings and infrastructure managers are required to define the assessment process for their staff.

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It is recommended that account be taken of each of the following:

A. Selection of personnel

— evaluation of individual experience and competence;

— evaluation of individual competence in the use of any required foreign language(s) or the aptitude to learn them.

B. Initial professional training

— analysis of training needs;

— training resources;

— training of the trainers.

C. Initial assessment

— basic conditions;

— assessment programme, including practical demonstration;

— qualification of the trainers;

— deliver a certificate of competency.

D. Competency retention

— principles for retention of competency;

— methods to be followed;

— formalisation of the competency retention process;

— assessment process.

E. Refresher training

— principles for on-going training (including language).

4.6.3.2. Analysis of training needs

4.6.3.2.1. Development of the analysis of training needs

The railway undertaking and the infrastructure manager must undertake an analysis of training needs for their relevant staff.

This analysis must set out both scope and complexity and take into account the risks associated with the operation of trains, especially in relation to human capabilities and limitations (human factors) which may come about as a result of:

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— differences in operating practices between infrastructure managers and the risks associated with changing between these;

— the differences between tasks, operating procedures and communication protocols;

— any difference in the 'operating' language used by the infrastructure manager's personnel;

— local operating instructions which may include special procedures or particular equipment to be applied in certain cases, for example a specific tunnel.

Guidance on the elements that should be considered can be found in the appendices referred to in point 4.6.1. As appropriate, elements of the training for staff must be put in places which take these into account.

It is possible that due to the type of operation envisaged by a railway undertaking or the nature of the network being run by an infrastructure manager, some of the elements in the appendices referred to in point 4.6.1 will not be appropriate. The analysis of training needs must document those not deemed appropriate and the reasons why.

4.6.3.2.2. Updating the analysis of training needs

The railway undertaking and the infrastructure manager must define a process for reviewing and updating their individual training needs, taking into account issues such as previous audits, system feedback and known changes to rules and procedures, infrastructure and technology.

4.6.3.2.3. Specific elements for train crew and auxiliary staff

4.6.3.2.3.1. Infrastructure knowledge

The railway undertaking must ensure that the on board staff has appropriate knowledge for the relevant infrastructure.

The railway undertaking must define the process by which knowledge of on board staff of the routes worked over is acquired and maintained. This process must be:

— based upon the route information provided by the infrastructure manager and

— in accordance with the process described in point 4.2.1.

4.6.3.2.3.2. Knowledge of rolling stock

The railway undertaking must define the process for the acquisition and retention of traction and rolling stock knowledge by its train crew.

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4.6.3.2.3.3. Auxiliary staff

The railway undertaking must make sure that the auxiliary staff (for example, catering and cleaning) not forming part of the 'train crew' is, in addition to their basic instruction, trained to respond to the instructions of the fully trained members of the 'train crew'.

4.7. **Health and safety conditions**

4.7.1. *Introduction*

Staff specified in point 4.2.1 as staff performing safety-critical tasks in accordance with point 2.2 must have appropriate fitness to ensure that overall operational and safety standards are met.

Railway undertakings and infrastructure managers must set up and document the process they put in place to meet the medical, psychological and health requirements for their staff within their safety management system.

Medical examinations as specified in point 4.7.4 and any associated decisions on the individual fitness of staff must be conducted by a recognised occupational doctor.

Staff must not perform safety-critical work whilst vigilance is impaired by substances such as alcohol, drugs or psychotropic medication. Therefore, the railway undertaking and the infrastructure manager must have in place procedures to control the risk that staff attend for work under the influence of such substances, or consume such substances at work.

National rules of the Member State where a train service is operated apply with regard to defined limits of those substances.

4.7.2. *Deleted*

4.7.3. *Deleted*

4.7.4. *Medical examinations and psychological assessments*

4.7.4.1. Before appointment

4.7.4.1.1. Minimum content of the medical examination

Medical examinations must cover:

— General medical examination;

— Examinations of sensory functions (vision, hearing, colour perception);

— Urine or blood analysis for the detection of diabetes mellitus and other conditions as indicated by the clinical examination;

— Screening for drugs of abuse.

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4.7.4.1.2. Psychological assessment

The aim of the psychological assessment is to support the railway undertaking in the appointment and management of staff who have the cognitive, psychomotor, behavioural and personality capabilities to perform their roles safely.

In determining the content of the psychological assessment the psychologist must, as a minimum, take the following criteria into account relevant to the requirements of each safety function:

(a) Cognitive:

— Attention and concentration,

— Memory,

— Perceptive capability,

— Reasoning,

— Communication.

(b) Psychomotor:

— Speed of reaction,

— Gestured coordination.

(c) Behavioural and personality

— Emotional self-control,

— Behavioural reliability,

— Autonomy,

— Conscientiousness.

If the psychologist omits any of those elements, the respective decision must be justified and documented.

4.7.4.2. After appointment

4.7.4.2.1. Periodicity of periodic medical examinations

At least one systematic medical examination must be performed:

— Every 5 years for staff aged up to 40;

— Every 3 years for staff aged between 41 and 62;

— Every year for staff aged over 62.

Increased periodicity of examination must be set by the occupational doctor if the state of health of the member of the staff requires so.

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4.7.4.2.2. Minimum content of the periodic medical examination

If the worker complies with the criteria required at the examination, which is carried out before practising an occupation, the periodic specialised examinations must include as a minimum:

— General medical examination;

— Examination of sensory functions (vision, hearing, colour perception);

— Urine or blood analysis for the detection of diabetes mellitus and other conditions as indicated by the clinical examination;

— Screening for drugs of abuse where clinically indicated.

4.7.4.2.3. Additional medical examinations and/or psychological assessments

Besides the periodic medical examination, an additional specific medical examination and/or psychological assessment must be performed where there is reasonable ground for doubting the medical or psychological fitness of a member of staff or reasonable suspicion of use of drugs of abuse or abuse or inappropriate use of alcohol. This would be the case especially after an incident or accident caused by human error on the part of the individual.

The employer must request a medical examination after any sickness absence exceeding 30 days. In suitable cases such an examination can be limited to an assessment by the occupational doctor based on available medical information indicating that the employee's fitness for work has not been affected.

The railway undertaking and the infrastructure manager must put systems in place to ensure that such additional examinations and assessments are undertaken as appropriate.

4.7.5. *Medical requirements*

4.7.5.1. General requirements

Staff must not suffer from medical conditions or take medical treatment likely to cause:

— Sudden loss of consciousness;

— Impairment of awareness or concentration;

— Sudden incapacity;

— Impairment of balance or coordination;

— Significant limitation of mobility.

The following vision and hearing requirements must be met:

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4.7.5.2. Vision requirements

— Aided or unaided distance visual acuity: 0,8 (right eye + left eye — measured separately); minimum of 0,3 for the worse eye;

— Maximum corrective lenses: hypermetropia + 5/myopia — 8. The occupational doctor may allow values outside this range in exceptional cases and after having sought the opinion of an eye specialist;

— Intermediate and near vision: sufficient whether aided or unaided;

— Contact lenses are allowed;

— Normal colour vision: using a recognised test, such as the Ishihara, completed by another recognised test if required;

— Vision field: normal (absence of any abnormality affecting the task to be performed);

— Vision for both eyes: present;

— Binocular vision: present;

— Contrast sensitivity: good;

— Absence of progressive eye disease;

— Lens implants, keratotomies and keratectomies are allowed only on condition that they are checked on a yearly basis or according to a periodicity set by the occupational doctor.

4.7.5.3. Hearing requirements

Sufficient hearing confirmed with tone audiogram, that is:

— Hearing good enough to keep a phone conversation going and be able to hear alert tones and radio messages.

— The following values given for information should be taken as guidelines:

— The hearing deficiency must not be higher than 40 dB at 500 and 1 000 Hz;

— The hearing deficiency must not be higher than 45 dB at 2 000 Hz for the ear with the worst air conduction of sound.

4.8. **Registers of infrastructure and vehicles**

Due to the characteristics of the registers of infrastructure and vehicles, as defined in Articles 33, 34 and 35 of Directive 2008/57/EC, these registers are not suitable for the particular requirements of the operation and traffic management subsystem. Therefore this TSI specifies nothing in respect of these registers.

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However, there is an operational requirement for certain infrastructure related data items to be made available to a railway undertaking and conversely for certain rolling stock related items to be made available to an infrastructure manager, as specified in point 4.8.1 and point 4.8.2. In both cases the data concerned must be complete and accurate.

4.8.1. *Infrastructure*

The requirements for the rail infrastructure related data items with regard to the operation and traffic management subsystem, and which must be made available to railway undertakings, are specified in Appendix D. The infrastructure manager is responsible for the correctness of the data.

4.8.2. *Rolling stock*

The following rolling stock related data items must be available to infrastructure managers. The keeper is responsible for the correctness of the data:

— whether the vehicle is constructed from materials which can be hazardous in case of accidents or fire (for example, asbestos);

— total length of the vehicle, including buffers if existing.

5. INTEROPERABILITY CONSTITUENTS

5.1. **Definition**

According to Article 2(f) of Directive 2008/57/EC, ‘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 interoperability of the rail system depends directly or indirectly. The concept of a ‘constituent’ covers both tangible objects and intangible objects such as software’.

5.2. **List of constituents**

In respect to the operation and traffic management subsystem, there are no interoperability constituents.

6. ASSESSMENT OF CONFORMITY AND/OR SUITABILITY FOR USE OF THE CONSTITUENTS AND VERIFICATION OF THE SUBSYSTEM

6.1. **Interoperability constituents**

As this TSI does not specify any interoperability constituents, no assessment arrangements are discussed.

6.2. **Operation and traffic management subsystem**

6.2.1. *Principles*

The operation and traffic management subsystem is a functional subsystem according to Annex II to Directive 2008/57/EC.

In conformity with Articles 10 and 11 of Directive 2004/49/EC, railway undertakings and infrastructure managers must demonstrate compliance with the requirements of this TSI within their safety management system when applying for any new or amended safety certificate or safety authorisation.

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The common safety methods on conformity assessment require national safety authorities to set up an inspection regime to supervise and monitor the day to day compliance with the safety management system including all TSIs. It should be noted that none of the elements contained within this TSI require separate assessment by a Notified Body.

Requirements in this TSI that refer to structural subsystems and are listed in the interfaces (point 4.3) are assessed under the relevant structural TSIs.

7. IMPLEMENTATION

7.1. **Principles**

Implementation of this TSI and conformity with the relevant points of this TSI must be determined in accordance with an implementation plan that must be drawn up by each Member State for the lines for which they are responsible.

This plan must take into account:

(a) the specific human factors issues associated with operating any given line;

(b) the individual operating and safety elements of each line involved; and

(c) whether implementation of the element(s) under consideration is to be:

— for all trains on the line, or not,

— only for certain lines,

— applicable on all lines,

— applicable to all trains running on the network

(d) the relationship with implementation with the other subsystems (control-command and signalling, rolling stock, etc.).

At this time any specific exceptions that may be applicable should be taken into account and documented as part of the plan.

The implementation plan must take into account the various levels of potential for implementation from any of the following events, namely when:

(a) a railway undertaking or infrastructure manager commences operations,

(b) a renewal or upgrade to the existing operational systems of a railway undertaking or infrastructure manager is introduced,

(c) new or upgraded infrastructure, energy, rolling stock or control-command and signalling subsystems, requiring a corresponding set of operating procedures, are put into service.

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It is commonly understood that the full implementation of all elements of this TSI cannot be complete until the hardware (infrastructure, control–command, etc.) that is to be operated has been harmonised. The guidelines set out in this Chapter must therefore only be seen as an interim phase supporting migration to the target system.

7.2. **Implementation guidelines**

There are three distinct elements to implementation:

(a) Confirmation that any existing systems and processes comply with the requirements of this TSI;

(b) Adaptation of any existing systems and processes to comply with the requirements of this TSI;

(c) New systems and processes arising from implementation of other subsystems;

— New/upgraded conventional lines (infrastructure/energy),

— New or upgraded ETCS signalling installations, GSM-R radio installations, Hot Axle Box Detectors, … (control-command and signalling),

— New rolling stock (rolling stock).

7.3. **Specific cases**

7.3.1. *Introduction*

The following special provisions are permitted in the specific cases below.

These specific cases belong to two categories:

— the provisions apply either permanently (case ‘P’), or temporarily (case ‘T’).

— in temporary cases Member States shall conform with the relevant subsystem either by 2016 (case ‘T1’), or by 2024 (case ‘T2’).

7.3.2. *List of specific cases*

7.3.2.1. Temporary specific case (T1) Estonia, Latvia and Lithuania

For the implementation of point 4.2.2.1.3.2 of this TSI, trains which are operated solely on the 1 520 mm gauge network of Estonia, Latvia and Lithuania may use another specified train rear end signal.

7.3.2.2. Temporary specific case (T2) Ireland and United Kingdom

For the implementation of 4.2.3.2.1 of this TSI, Ireland and United Kingdom are using alphanumeric number in the existing systems. The MS set out the requirements and time schedule for the transition from alphanumeric train running numbers to numeric train running numbers in the target system.

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Appendix A

ERTMS/ETCS and ERTMS/GSM-R operating rules

The operating rules for ERTMS/ETCS and ERTMS/GSM-R are specified in the Technical Document ‘ERTMS operational principles and rules — version 3’ published on the ERA website (www.era.europa.eu).

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Appendix B

Other rules enabling a coherent operation

A. GENERAL

Reserved

B. STAFF SAFETY AND SECURITY

Reserved

C. OPERATIONAL INTERFACE WITH SIGNALLING AND COMMAND AND CONTROL EQUIPMENT

C1. **Sanding**

If the train is equipped with manually activated sanding device, the driver shall always be allowed to apply sand but shall avoid it wherever possible:

— in the area of points and crossings,

— during braking at speeds less than 20 km/h,

— when at a standstill.

The exceptions to this are

— if there is a risk of SPAD (Signal Passed at Danger), or other serious incident and the application of sand would assist adhesion,

— when starting away, or

— when required to test the sanding equipment on the traction unit. (Testing shall not be undertaken in areas specifically designated in the Infrastructure Register).

C2. **Activation of Hot Axle Box Detectors**

Reserved

D. TRAIN MOVEMENTS

D1. **Normal conditions**

D2. **Degraded conditions**

Reserved

E. ANOMALIES, INCIDENTS AND ACCIDENTS

Reserved

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Appendix C

Safety related communications methodology

INTRODUCTION

This Appendix sets out the rules for safety-related ground-to-mobile and mobile-to-ground communications applicable to information transmitted or exchanged for safety-critical situations on the interoperable network and in particular to:

— define the nature and structure of the safety-related messages;

— define the methodology for voice transmission of those messages.

This Appendix is to serve as basis:

— in order to enable the infrastructure manager to draw up the messages and books of forms. These elements shall be addressed to the railway undertaking at the same time as the rules and regulations are made available; for the Infrastructure Manager and the Railway Undertaking to draw up the documents for their staff (Books of Forms), instructions for staff authorising train movements and Appendix 1 to the Driver's Rule Book 'Manual of communication procedures'.

The extent to which forms are used and their structure may vary. For some risks the use of forms will be appropriate, whilst for others it will not be appropriate.

In the context of a given risk, the Infrastructure Manager shall decide whether the use of a form is appropriate. A form should only be used if the value of its safety and performance benefits exceeds that of any safety and performance disadvantage.

The Infrastructure Managers must structure his communications protocol in a formalised way and in line with the following 3 categories:

— urgent (emergency) verbal messages;

— written orders;

— additional performance messages.

To support the disciplined approach to transmission of these messages a Communications Methodology has been developed.

1. COMMUNICATIONS METHODOLOGY

1.1. **Elements and principles of the methodology**

1.1.1. *Standard terminology to be used in the procedures*

1.1.1.1. Speech transmission procedure

Term transferring the opportunity to speak to the opposite party:

over

1.1.1.2. Message receiving procedure

— upon receiving a direct message

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Term confirming that the sent message has been received:

received

Term used to have the message repeated in the event of poor reception or misunderstanding

say again (+ speak slowly)

— upon reception of a message that has been read-back

Terms used to ascertain whether a read-back message exactly matches the sent message:

correct

or not:

error (+ I say again)

1.1.1.3. Communications breaking procedure

— if the message has ended:

out

— if break is temporary and does not break the connection

Term used to keep the other party waiting:

wait

— if break is temporary but the connection is broken

Term used to tell the other party that the communication is going to be broken but will be resumed later on:

I call again

1.1.1.4. Cancelling a written order

Term used to cancel the written order procedure underway:

cancel procedure ….....

If the message is then subsequently to be resumed, the procedure shall be repeated from the start.

1.1.2. *Principles to be applied in the event of error or misunderstanding*

To permit the correction of possible errors during communication, the following rules shall be applied:

1.1.2.1. Errors

— error during transmission

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When a transmission error is discovered by the sender himself, the sender must request cancellation by sending the following procedure message:

error (+ prepare new form …..**)**

or:

error + I say again

and then send the initial message again.

— error during read-back

When the sender discovers an error whilst the message is being read back to him, the sender shall send the following procedure messages:

error + I say again

and send the initial message again.

1.1.2.2. Misunderstanding

If one of the parties misunderstands a message he must ask the other party to repeat the message by using the following text:

say again (+ speak slowly)

1.1.3. *Word, number, time, distance, speed and date spelling code*

To help understanding and expressing messages in different situations, each term must be pronounced slowly and correctly by spelling out any words or names and figures likely to be misunderstood. Examples would be the identifying codes for signals or points.

The following spelling rules shall apply:

1.1.3.1. Spelling out of words and letter groups

The International Phonetic Alphabet shall be used.

A	*Alpha*	*G*	*Golf*	*L*	*Lima*	*Q*	*Quebec*	*V*	*Victor*
B	*Bravo*	*H*	*Hotel*	*M*	*Mike*	*R*	*Romeo*	*W*	*Whisky*
C	*Charlie*	*I*	*India*	*N*	*November*	*S*	*Sierra*	*X*	*X-ray*
D	*Delta*	*J*	*Juliet*	*O*	*Oscar*	*T*	*Tango*	*Y*	*Yankee*
E	*Echo*	*K*	*Kilo*	*P*	*Papa*	*U*	*Uniform*	*Z*	*Zulu*
F	*Foxtrot*								

Example:

Points A B = points alpha-bravo.

Signal Number KX 835 = signal Kilo X-Ray eight three five.

The Infrastructure Manager may add further letters, along with a phonetic pronunciation for each letter added, if required by the alphabet of the Infrastructure Manager's operating language(s).

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The Railway Undertaking may add further indications about pronunciation, as it deems necessary.

1.1.3.2. Expression of numbers

Numbers shall be spoken digit by digit.

0	*Zero*	*3*	*Three*	*6*	*Six*	*9*	*Nine*
1	*One*	*4*	*Four*	*7*	*Seven*		
2	*Two*	*5*	*Five*	*8*	*Eight*		

Example: train 2183 = train two-one-eight-three.

Decimals shall be expressed by the word ‘point’.

Example: 12.50 = one-two-point-five-zero

1.1.3.3. Expression of time

The time shall be given in local time, in plain language.

Example: 10:52 hours = ten fifty-two.

Whilst this is the principle, it would also be acceptable, whenever necessary, for the time to be spelled out digit by digit (one zero five two hours).

1.1.3.4. Expression of distances and speeds

Distances shall be expressed in kilometres and speeds in kilometres per hour.

Miles may be used if that unit is used on the infrastructure concerned.

1.1.3.5. Expression of dates

Dates shall be expressed in the usual manner.

Example: 10 December

1.2. **Communications structure**

The voice transmission of safety-related messages shall in principle comprise 2 phases as follows:

— identification and request for instructions;

— transmission of the message itself and termination of the transmission.

The first phase may be cut back or entirely skipped for top priority safety messages.

1.2.1. *Rules for identification and requests for instruction*

To enable the parties to identify one another, define the operational situation and transmit procedural instructions, the following rules shall apply:

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1.2.1.1. Identification

It is very important that at the beginning of each communication, other than very urgent top priority emergency messages, the persons who are going to communicate identify themselves. Drivers identify themselves by train running number and position. For communication between signaller and driver it is the signaller's lead responsibility to ensure that the right signaller and driver are in communication. This is especially critical when communication is taking place in areas where communications boundaries overlap.

This principle shall apply even after an interruption during transmission.

The following messages shall be used for this purpose by the different parties.

— by the staff authorising train movements:

train .....
(number)
this is ..... Signals
(name)

— by the driver:

..... Signals
(name)
this is train .....
(number)

It should be noted that the identification may be followed by an additional information message giving the staff authoring train movements enough details of the situation to determine precisely the procedure that the driver may subsequently be required to follow.

1.2.1.2. Request for instructions

Every application of a procedure supported by a written order must be preceded by a request for instructions.

The following terms shall be used to request instructions:

prepare procedure ….....

1.2.2. *Rules for transmission of written orders and verbal messages*

1.2.2.1. Top priority safety messages

Due to their urgent and imperative nature, these messages:

— may be sent or received while running;

— may skip the identification part;

▼B

— shall be repeated;

— shall, as soon as possible, be followed by further information.

1.2.2.2. Written Orders

In order to reliably send or receive (at a standstill) the procedural messages contained in the Book of Forms, the following rules shall be followed:

1.2.2.2.1. Message sending

The form may be completed prior to transmitting the message so that the full text of the message can be sent in one single transmission.

1.2.2.2.2. Message receiving

The receiver of the message must fill in the form contained in the Book of Forms based upon the information given by the sender.

1.2.2.2.3. Read-back

All the predetermined railway messages in the Book of Forms shall be required to be read back. The read-back shall include the message shown in the grey field on the Forms, the 'report back' section and any additional or complementary information.

1.2.2.2.4. Acknowledgement of correct read-back

Every read-back message shall be followed by an acknowledgement of conformity or non-conformity given by the sender of the message.

correct

or

error + I say again

followed by a repeat sending of the initial message

1.2.2.2.5. Acknowledgement

Every message received shall be acknowledged positively or negatively as follows:

received

or

negative, say again (+ speak slowly)

1.2.2.2.6. Traceability and verification

A unique identification or authorisation number shall accompany all messages initiated from the ground:

— if the message concerns an action for which the driver requires a specific authorisation (e.g. passing a signal at danger,…):

▼B

authorisation … ..... *(number)*

— in all other cases (e.g. proceeding with caution,…):

message … ..... *(number)*

1.2.2.2.7 Reporting Back

Every message comprising a request to 'report back' shall be followed by a 'report'.

1.2.2.3. Additional messages

Additional messages

— shall be preceded by the identification procedure;

— shall be short and precise (limited wherever possible to information to be communicated and where it applies);

— shall be read back and followed by an acknowledgement of correct read-back, or not

— may be followed by a request for instructions or a request for further information.

1.2.2.4. Information messages with a variable non-predetermined content

Information messages with a variable content shall be:

— preceded by the identification procedure;

— prepared before sending;

— read back and followed by an acknowledgement of correct read-back, or not.

2. PROCEDURAL MESSAGES

2.1. **Nature of the messages**

Procedural messages are used to send operational instructions associated with appropriate situations represented in the Driver's Rule Book.

They comprise the text of the message itself, corresponding to a situation, and a number identifying the message.

If the message requires the recipient to report back, the text of the report is also given.

These messages use predetermined wording prescribed by the Infrastructure Manager in his 'operating language' and they are presented in the form of pre-prepared forms in either paper format or in computer medium.

▼B

2.2. **Forms**

Forms are a formalised medium for communicating procedural messages. These messages are generally those associated with degraded working conditions. Typical examples would be the authority for a driver to pass a signal or an 'end of movement authority', the requirement to run at reduced speed in a particular area, or to examine the line. There may well be other circumstances that will require the use of such messages.

Their purpose is to:

— provide a common working document used in real-time by the staff authorising train movements and by the drivers;

— provide the driver (especially when working in an unfamiliar or rare environment) with a reminder of the procedure he will required to follow;

— enable traceability of communications.

In order to identify the forms, a unique code word or number relating to the procedure shall be developed. This could be based on the potential frequency that a form would be used. If, of all the forms being developed, the likelihood is that the one most often used is the one for passing a signal or EOA at danger, then this one could be numbered 001 and so on.

2.3. **Book of Forms**

Having identified all the forms to be used, the whole set must be collected into a document or a computer medium called the Book of Forms.

It is a joint document that will be used by the driver and the staff authorising the movement of trains when they communicate with each other. It is important therefore that the book used by the driver and the one used by the staff authorising the movement of trains are constructed and numbered in the same manner.

The Infrastructure Manager is responsible for drawing up the Book of Forms and the forms themselves in his 'operating language'.

The language to be used when transmitting the messages shall always be the 'operating language' of the Infrastructure Manager.

The Book of Forms shall comprise two parts.

The first part contains the following items:

— a reminder about the utilisation of the Book of Forms;

— an index of ground-originated Procedure Forms;

— an index of driver-originated Procedure Forms, where appropriate;

— the list of situations cross-referencing to which procedure form is to be used;

▼B

— a glossary giving the situations to which each procedure form applies;

— the code for spelling out messages (phonetic alphabet etc.).

The second part contains the Procedure Forms themselves. These must be collected by the RU and given to the driver.

3. ADDITIONAL MESSAGES

Additional messages are information messages used to inform about situations of a rare nature and for which therefore a pre-determined form is considered unnecessary, or related to train running or to the technical condition of the train or the infrastructure, either;

— by the driver to inform the staff authorising train movements, or

— by the staff authorising train movements to advise the driver

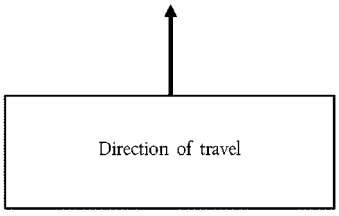
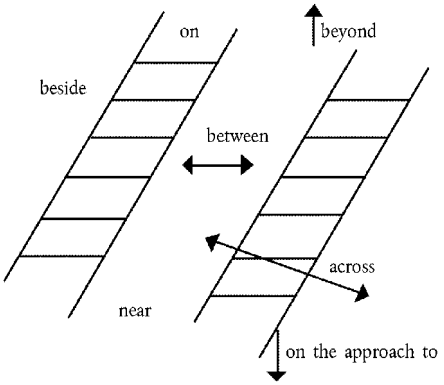
To make it easier to describe the situations and construct the information messages, message guidelines, a glossary of railway terminology, a descriptive diagram of the rolling stock being employed and a descriptive statement of the infrastructure equipment (track, traction supply, etc.) may be beneficial.

3.1. **Guideline structure for messages**

These messages may be structured along the following lines:

Stage in the communication flow	Message element
Reason for passing the information	☐ for information ☐ for action
Observation	☐ There is ☐ I saw ☐ I had ☐ I hit
Position	
— along the line	☐ at … ..... *(station name)* ☐ ..... … *(characteristic point)* ☐ at mile post/kilometre point … ..... *(number)*
— in respect to my train	☐ power car … ..... *(number)* ☐ trailer car … ..... *(number)*
Nature — object — person	..... … *(see glossary)*

▼B

Stage in the communication flow	Message element
State	
— static	☐ standing on ☐ lying on ☐ fallen on
— moving	☐ walking ☐ running ☐ towards
Location with respect to the tracks 	

These messages may be followed by a request for instructions.

The elements of the messages are provided in both the language chosen by the Railway Undertaking and in the operating language(s) of the Infrastructure Managers concerned.

3.2. **Glossary of Railway Terminology**

The Railway Undertaking shall produce a glossary of railway terminology for each network over which his trains operate. It shall supply the terms in regular use in the language chosen by the Railway Undertaking and in the 'operating' language of the Infrastructure Manager(s) whose infrastructure is worked over.

The glossary shall be composed of two parts:

— a listing of terms by subject matter;

— a listing of the terms in alphabetical order.

3.3. **Descriptive diagram of the rolling stock**

If the Railway Undertaking feels it would benefit his operation a descriptive diagram of the rolling stock used shall be prepared. It shall list the names of the various components that may be the subject of communications with the different Infrastructure Managers concerned and include the common names for the standard terms in the language chosen by the Railway Undertaking and in the 'operating' language of the Infrastructure Manager(s) whose infrastructure is worked over.

3.4. **Descriptive statement of the characteristics of the infrastructure equipment (track, traction supply, etc.)**

If the Railway Undertaking feels it would benefit his operation a descriptive statement of the characteristics of the infrastructure equipment (track, traction supply, etc.) on the route worked over shall be prepared. This shall show the names of the various components that may be the subject of communications with the Infrastructure Manager(s) concerned. It shall include the common names for the standard terms in the language chosen by the Railway Undertaking and in the 'operating' language of the Infrastructure Manager(s) whose infrastructure is worked over.

▼B

4. TYPE AND STRUCTURE OF VERBAL MESSAGES

4.1. **Emergency messages**

Emergency messages are intended to give urgent operational instructions that are directly linked with the safety of the railway.

To avoid any risk of misunderstanding, messages must always be repeated once.

Classified according to need, the main messages which can be sent are indicated hereafter.

The Infrastructure Manager may, in addition, define other emergency messages according to the needs of his operation.

Emergency messages may be followed by a Written Order (see Subsection 2).

The type of text that goes to form Emergency messages must be included in Appendix 1 'Manual of communications procedures' to the Driver's Rule Book and in the documentation issued to staff authorising train movements.

4.2. **Messages sent either by the ground or the driver**

(a) Need to stop all trains:

The need to stop all trains must be transmitted by means of an acoustic signal; if this is not available the following phrase must be used:

Emergency, stop all trains

Information on location or area is, if necessary, specified in the message.

In addition, this message is to be quickly complemented, if possible, by the reason, the location of the emergency and the train's identification:

Obstruction **Or Fire** **Or** .... *(other reason)* **on line** ..... **at** ..... *(name)* *(km)* **Driver of train** .... *(number)*

(b) Need to stop a particular train:

Train ..... **(on line/track)** *(number)* *(name/number)*

In this circumstance the name or number of the line or track on which the train is running may be used to complement the message.

▼B

4.3. **Messages issued by the driver**

Need to cut the traction power supply:

Emergency current isolation

This message is to be quickly complemented, if possible, by the reason, the location of the emergency and the train's identification:

At .... *(km)*
on line/track .... *(name/number)*
between ..... **and** ..... *(station)* *(station)*
Reason ....
Driver of train .... *(number)*

In this circumstance the name or number of the line or track on which the train is running may be used to complement this message.

▼B

Appendix D

Information to which the Railway Undertaking must have access in connection with the route(s) over which he intends to operate

PART 1. GENERIC INFORMATION REGARDING THE INFRASTRUCTURE MANAGER

1.1. Name (s)/Identity of Infrastructure Manager(s)

1.2. Country (or Countries)

1.3. Brief description

1.4. List of general operational rules and regulations (and how to obtain them)

PART 2. MAPS AND DIAGRAMS

2.1. Geographic map

2.1.1. Routes

2.1.2. Principal locations (stations, yards, junctions, freight terminals)

2.2. Line diagram

Information to be included on diagrams, supplemented as necessary by text. Where a separate station/yard/depot diagram is provided then information on line diagram may be simplified

2.2.1. Indication of distance

2.2.2. Identification of running lines, loops, sidings and catch/trap points

2.2.3. Connections between running lines

2.2.4. Principal locations (stations, yards, junctions, freight terminals)

2.2.5. Location and meanings of all fixed signals

2.3. Station/Yard/Depot diagrams (N.B. applies only to locations available to interoperable traffic)

Information to be identified on location specific diagrams, supplemented as necessary by text

2.3.1. Name of location

2.3.2. Location identity code

2.3.3. Type of location (passenger terminal, freight terminal, yard, depot)

2.3.4. Location and meanings of all fixed signals

2.3.5. Identification and plan of tracks, including catch/trap points

2.3.6. Identification of platforms

2.3.7. Length of platforms

2.3.8. Height of platforms

2.3.9. Identification of sidings

2.3.10. Length of sidings

2.3.11. Availability of shore electric supply

2.3.12. Distance between the edge of the platform and the centre of the track, parallel to the running surface

▼B

2.3.13. (For passenger stations) Availability of access for disabled persons

PART 3. SPECIFIC LINE SEGMENT INFORMATION

3.1. General Characteristics

3.1.1. Country

3.1.2. Line segment identification code: national code

3.1.3. Line segment extremity 1

3.1.4. Line segment extremity 2

3.1.5. Times of opening for traffic (times, days, special arrangements for holidays)

3.1.6. Lineside indications of distance (frequency, appearance and positioning)

3.1.7. Type of traffic (mixed, passenger, freight, …)

3.1.8. Maximum permissible speed(s)

3.1.9. Any other information which is necessary for safety reasons

3.1.10. Specific local operational requirements (including any special staff qualifications)

3.1.11. Special restrictions for dangerous goods

3.1.12. Special loading restrictions

3.1.13. Model of temporary works notice (and way to obtain it)

3.1.14. Indication that Line segment is congested (Article 22 of Directive 2001/14/EC)

3.2. Specific Technical Characteristics

3.2.1. EC verification for Infrastructure TSI

3.2.2. Date of putting into service as an interoperable line

3.2.3. List of possible specific cases

3.2.4. List of possible specific derogations

3.2.5. Track gauge

3.2.6. Structure gauge

3.2.7. Maximum axle load

3.2.8. Maximum load per linear metre

3.2.9. Transversal track forces

3.2.10. Longitudinal track forces

3.2.11. Minimum radius of curvature

3.2.12. Gradient percentage

3.2.13. Gradient location

3.2.14. For brake system that does not use wheel-rail adhesion, accepted braking effort

3.2.15. Bridges

3.2.16. Viaducts

3.2.17. Tunnels

▼B

3.2.18. Comments

3.3. Energy subsystem

3.3.1. EC verification for Energy TSI

3.3.2. Date of putting into service as an interoperable line

3.3.3. List of possible specific cases

3.3.4. List of possible specific derogations

3.3.5. Type of power supply system (e.g. none, overhead, 3rd rail)

3.3.6. Power supply system frequency (e.g. AC, DC)

3.3.7. Minimum voltage

3.3.8. Maximum voltage

3.3.9. Restriction related to power consumption of specific electric traction unit(s)

3.3.10. Restriction related to the position of Multiple Traction unit(s)s to comply with contact line separation (position of pantograph)

3.3.11. How to obtain electrical isolation

3.3.12. Contact wire height

3.3.13. Permissible contact wire gradient in relation to the track and the variation of the gradient

3.3.14. Type of pantographs approved

3.3.15. Minimum static force

3.3.16. Maximum static force

3.3.17. Location of neutral sections

3.3.18. Information on operation

3.3.19. Lowering of pantographs

3.3.20. Conditions applying with regard to regenerative braking

3.3.21. Maximum allowable train current

3.4. Control-Command and Signalling subsystem

3.4.1. EC verification for CCS TSI

3.4.2. Date of putting into service as an interoperable line

3.4.3. List of possible specific cases

3.4.4. List of possible specific derogations

ERTMS/ETCS

3.4.5. Level of application

3.4.6. Optional functions installed lineside

3.4.7. Optional functions required on board

3.4.8. Software version number

3.4.9. Placing-in-service date of this version

ERTMS/GSM-R radio

▼B

3.4.10. Optional functions as specified in FRS

3.4.11. Version number

3.4.12. Placing-in-service date of this version

For ERTM/ETCS level 1 with infill function

3.4.13. Technical implementation required for rolling stock

Class B train protection, control and warning system(s)

3.4.14. National rules for operating class B systems (+ way to obtain them)

Line system

3.4.15. Responsible Member State

3.4.16. System name

3.4.17. Software Version number

3.4.18. Placing-in-service date of this version

3.4.19. End of period of validity

3.4.20. Need for more than one system active simultaneously

3.4.21. On-board system

Class B radio system

3.4.22. Responsible Member State

3.4.23. System name

3.4.24. Version number

3.4.25. Placing-in-service date of this version

3.4.26. End of period of validity

3.4.27. Special conditions to switch over between different class B train protection, control and warning systems

3.4.28. Special technical conditions required to switch over between ERTMS/ETCS and Class B Systems

3.4.29. Special conditions to switch over between different radio systems

Technical degraded modes of:

3.4.30. ERTM/ETCS

3.4.31. Class B train protection, control and warning system

3.4.32. ERTM/GSM-R

3.4.33. Class B radio system

3.4.34. Lineside signalling

Speed restrictions related to braking performance

3.4.35. ERTM/ETCS

3.4.36. Class B train protection, control and warning systems

National rules for functioning Class B system

▼B

3.4.37.	National rules linked to braking performance
3.4.38.	Other national rules, e.g.: data corresponding with UIC leaflet 512 (8th edition of 1.1.79 and 2 Amendments)
	EMC Susceptibility of infrastructure-side Control-command and signalling
3.4.39.	Requirement to be specified according to European Standards
3.4.40.	Permissibility to use Eddy-current brake
3.4.41.	Permissibility to use magnetic brake
3.4.42.	Requirements for technical solutions concerning implemented derogations
3.5.	Traffic Operation and Management Subsystem
3.5.1.	EC verification for OPE TSI
3.5.2.	Date of putting into service as an interoperable line
3.5.3.	List of possible specific cases
3.5.4.	List of possible specific derogations
3.5.5.	Language used for safety-critical communications with infrastructure manager staff
3.5.6.	Special climatic conditions and associated arrangements

▼B

Appendix E

Language and communication level

The oral qualification in a language can be subdivided into five levels:

Level	Description
5	— can adapt the way he/she speaks to any interlocutor — can put forward an opinion — can negotiate — can persuade — can give advice
4	— can cope with totally unforeseen situations — can make assumptions — can express an argued opinion
3	— can cope with practical situations involving an unforeseen element — can describe — can keep a simple conversation going
2	— can cope with simple practical situations — can ask questions — can answer questions
1	— can talk using memorised sentences

▼B

Appendix F

Not used

▼B

Appendix G

Not used

▼B

Appendix H

Not used

▼B

Appendix 1

Not used

▼B

Appendix J

Minimum elements relevant to professional qualification for the tasks associated with 'accompanying trains'

1. GENERAL REQUIREMENTS

(a) This Appendix, which must be read in conjunction with points 4.6 and 4.7 is a list of the elements that are deemed to be relevant to the task of accompanying a train on the network.

(b) The expression 'professional qualification', when taken within the context of this TSI, refers to those elements that are important to ensuring that operational staff are trained and able to understand and discharge the elements of the task.

(c) Rules and procedures apply to the task being performed and to the person carrying out the task. These tasks may be carried out by any authorised qualified person irrespective of any name, job title or grade used in rules or procedures or by the individual company.

(d) Any authorised qualified person must carry out all rules and procedures related to the task being performed.

2. PROFESSIONAL KNOWLEDGE

Any authorisation requires a successfully passed initial examination and provisions for ongoing assessment and training as described in point 4.6.

2.1. **General professional knowledge**

(a) General principles of safety management within the railway system, relevant to the task, including interfaces with other subsystems

(b) General conditions relevant to the safety of passengers or cargo and persons on or about the railway track

(c) Conditions of health and safety at work

(d) General principles of security of the railway system

(e) Personal safety including when leaving the train on the running line

2.2. **Knowledge of operational procedures and safety systems applied to the infrastructure to be used**

(a) Operational procedures and safety rules

(b) Control-command and signalling system

(c) Communications principles and formalised messaging procedure including use of communication equipment

2.3. **Knowledge of rolling stock**

(a) Passenger vehicle interior equipment

▼B

(b) Repairing minor defects within the passenger areas of rolling stock, as required by the Railway Undertaking

2.4. **Knowledge of the route**

(a) Operational arrangements (such as the method of train despatch) at individual locations (signalling, station equipment etc.)

(b) Stations at which passengers may alight or join

(c) Local operating and emergency arrangements specific to the line(s) of route

3. ABILITY TO PUT THE KNOWLEDGE INTO PRACTICE

(a) Checks before departure, including brake tests and correct closure of the doors

(b) Departure processes

(c) Communication with passengers especially in relation to circumstances involving passenger safety

(d) Degraded operations

(e) Assess the potential of a defect within the passenger areas and react according to rules and procedures

(f) Protection and warning measures as required by the rules and regulations or in assistance to the driver

(g) Train evacuation and passenger safety especially if they are required to be on or near the line

(h) Communicate with the Infrastructure Manager's staff when assisting the driver or during an evacuation incident

(i) Report any unusual occurrences concerning the operation of the train, the condition of the rolling stock and the safety of passengers. If required these reports must be made in writing, in the language chosen by the Railway Undertaking.

▼B

Appendix K

Not used

▼B

Appendix L

Minimum elements relevant to professional qualification for the task of preparing trains

1. GENERAL REQUIREMENTS

This Appendix, which must be read in conjunction with point 4.6, gives a list of the elements that are deemed to be relevant to the task of preparing a train on the network.

(a) The expression 'professional qualification', when taken within the context of this TSI, refers to those elements that are important to ensuring that operational staff are trained and able to understand and discharge the elements of the task.

(b) Rules and procedures apply to the task being performed and to the person carrying out the task. These tasks may be carried out by any authorised qualified person irrespective of any name, job title or grade used in rules or procedures or by the individual company.

(c) Any authorised qualified person must follow all rules and procedures related to the task being performed.

2. PROFESSIONAL KNOWLEDGE

Any authorisation requires a successfully passed initial examination and provisions for ongoing assessment and training as described in point 4.6.

2.1. **General professional knowledge**

(a) General principles of safety management within the railway system, relevant to the task, including interfaces with other subsystems

(b) General conditions relevant to the safety of passengers and/or cargo including the carriage of dangerous goods and exceptional loads

(c) Conditions of health and safety at work

(d) General principles of security of the railway system

(e) Personal safety when on or in the vicinity of rail lines

(f) Communications principles and formalised messaging procedure including use of communication equipment

2.2. **Knowledge of operational procedures and safety systems applied to the infrastructure to be used**

(a) Working of trains in normal, degraded and emergency conditions

(b) Operational procedures at individual locations (signalling, station/depot/yard equipment) and safety rules

(c) Local operating arrangements

▼B

2.3. **Knowledge of train equipment**

(a) Purpose and use of wagon and vehicle equipment

(b) Identification of and arranging for technical inspections

3. ABILITY TO PUT THE KNOWLEDGE INTO PRACTICE

(a) Application of train composition rules, train braking rules, train loading rules etc. to ensure the train is in running order

(b) Understanding of marking and labels on vehicles

(c) Process for determining and making train data available

(d) Communication with train crew

(e) Communication with staff responsible for controlling the movement of trains

(f) Degraded operations especially as it affects the preparation of trains

(g) Protection and warning measures as required by the rules and regulations or local arrangements at the location in question

(h) Actions to be taken in respect to incidents involving the carriage of dangerous goods (where relevant)

▼B

Appendix M

Not used

▼B

Appendix N

Not used

▼B

Appendix O

Not used

▼B

Appendix P

European Vehicle Number and linked alphabetical marking on the bodywork

1. GENERAL PROVISIONS ON THE EUROPEAN VEHICLE NUMBER

The European Vehicle Number is assigned according to the codes as defined in Decision 2007/756/EC, Appendix 6.

The European Vehicle Number shall be changed when it does not reflect the interoperability capability or technical characteristics according to this Appendix due to technical modifications of the vehicle. Such technical modifications may require a new placing in service according to Articles 20 to 25 of Directive 2008/57/EC.

2. GENERAL ARRANGEMENTS FOR EXTERNAL MARKINGS

The capital letters and figures making up the marking inscriptions shall be at least 80 mm in height, in a sans serif font type of correspondence quality. A smaller height may only be used where there is no option but to place the marking on the sole bars.

The marking is put not higher than 2 metres above rail level.

The keeper can add, in letters of larger size than the European Vehicle Number, an own number marking (consisting generally of digits of the serial number supplemented by alphabetical coding) useful in operations. The place where the own number is marked is left to the choice of the keeper; however it must always be possible to distinguish easily the European Vehicle Number from the keeper's own number marking.

3. WAGONS

The marking shall be inscribed on the wagon bodywork in the following manner:

23.	TEN	31.	TEN	33.	TEN
80	D-RFC	80	D-DB	84	NL-ACTS
7369	553-4	0691	235-2	4796	100-8
Zcs		Tanoos		Slpss	

Where in the examples

D and NL stand for the registering Member State as set out in NVR-decision 2007/756/EC, Appendix 6, part 4.

RFC, DB and ACTS stand for the keeper marking as set out in NVR-decision 2007/756/EC, Appendix 6, part 1.

For wagons whose bodywork does not offer a large enough area for this type of arrangement, particularly in the case of flat wagons, the marking shall be arranged as follows:

0187	3320	644-7
TEN	F-SNCF	Ks

▼B

When one or more index letters with a national definition are inscribed on a wagon, this national marking must be shown after the international letter marking and separated from it by a hyphen as follows:

0187	3320	644-7
TEN	F-SNCF	Ks-xy

4. COACHES AND HAULED PASSENGER STOCK

The number shall be applied to each sidewall of the vehicle in the following manner:

F-SNCF 61 87 20 – 72 021 – 7
B^{10} tu

The marking of the country in which the vehicle is registered and of the technical characteristics are printed directly in front of, behind or under the European Vehicle number.

In case of coaches with driver's cabin, the European Vehicle number is also written inside the cabin.

5. LOCOMOTIVES, POWER CARS AND SPECIAL VEHICLES

The European Vehicle Number must be marked on each sidewall of the tractive stock in the following manner:

92 10 1108 062-6

The European Vehicle Number is also written inside each cabin of the tractive rolling stock.

6. ALPHABETICAL MARKING OF THE INTEROPERABILITY CAPABILITY

'TEN': Vehicle which:

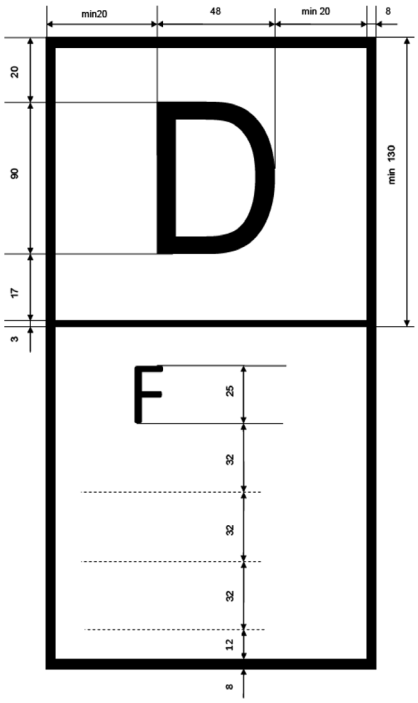
(a) complies with all relevant TSIs which are in force at the moment of placing in service and has been authorised to be placed in service according to Article 22(1) of Directive 2008/57/EC, and

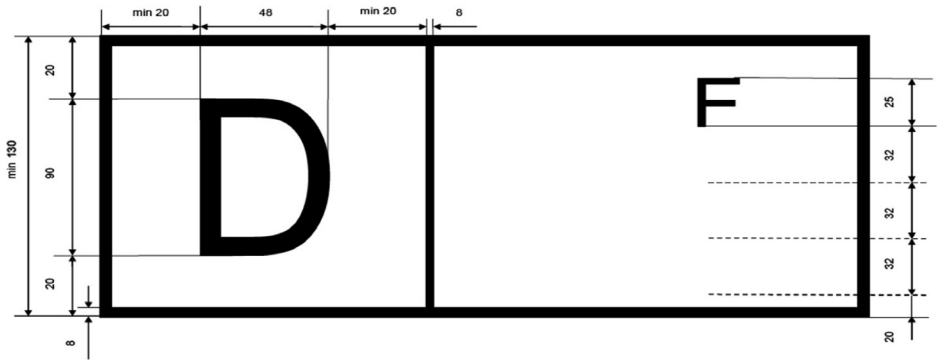
(b) is provided with an authorisation valid in all Member States in accordance with Article 23(1) of Directive 2008/57/EC.

'PPV/PPW': Vehicle which complies with PPV/PPW or PGW agreement (inside OSJD States). (original: PPV/PPW: ППВ (Правила пользования вагонами в международном сообщении); PGW: Правила Пользования Грузовыми Вагонами).

Vehicles which are not authorised to be placed in service in all Member States in accordance with Article 23(1) of Directive 2008/57/EC need a marking indicating the Member States where the vehicle is authorised to be placed into service. This marking shall be according to one of the following drawings, where D stands for the Member State who has granted the first authorisation (in the given example, Germany) and F stands for the second authorising MS (in the given example, France). The MS are codified in accordance with Decision 2007/756/EC, Appendix 6, part 4.

▼**B**


min20
48
min 20
8
20
90
17
3
min 130
D
F
25
32
32
32
12
8


min 20
48
min 20
8
min 130
20
90
20
8
D
F
25
32
32
32
20

▼B

Appendix Q

Not used

▼B

Appendix R

Not used

▼B

Appendix S

Not used

▼B

Appendix T

Braking performance

A. ROLE OF THE INFRASTRUCTURE MANAGER

The IM shall inform the RU about the braking performance required for each route and has to provide information about the route characteristics. The IM has to ensure that the impact of the route characteristics and track-side related margins are included in the required braking performance.

Unless the IM and RU have agreed on another unit to express the braking performance, the required braking performance shall be expressed:

(1) for trains able to run at a maximum speed higher than 200 km/h, in deceleration profile and equivalent response time on level track,;

(2) for train sets or for fixed train compositions, unable to run at a maximum speed higher than 200 km/h, in deceleration (as above in 1) or in brake weight percentage;

The IM shall also deliver the requirements in the alternate unit (brake weight percentage or deceleration), if so requested by the RU;

(3) for other trains (variable compositions of trains unable to run at a maximum speed higher than 200 km/h): in brake weight percentage.

B. ROLE OF THE RAILWAY UNDERTAKING

The RU shall ensure that each train satisfies or exceeds the braking performance required by the IM. Therefore the RU shall calculate the braking performance of a train taking into account the train composition.

The RU must take into account the vehicle or train set braking performance determined when placed in service. Rolling Stock-related margins like reliability and availability of the brakes have to be considered. The RU must also take into account the information about route characteristics which affect the train behaviour when tuning the braking performance for stopping and securing a train.

The braking performance resulting from the checking of the actual train (like train composition, brake availability, brake settings) will be used as an input value for any operational rule to be subsequently applied to the train.

C. BRAKING PERFORMANCE NOT ACHIEVED

The IM has to set up rules to be used if a train does not reach the required braking performance and has to make these rules available to the RUs.

If a train does not reach the braking performance required for the routes the train shall run, the RU has to respect the resulting constraints like speed restriction.

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Appendix U

List of open points

APPENDIX B (SEE POINT 4.4 OF THIS TSI)

Other rules enabling a coherent operation

POINT 4.2.2.1.3.3

Freight trains not crossing a border between Member States

▼B

Appendix V

Not used

▼B

Appendix W

Glossary

The definitions in this glossary refer to the use of terms in this TSI OPE.

Term	Definition
Accident	As defined in Article 3 of Directive 2004/49/EC.
Authorising the movement of trains	The operation of equipment in signalling centres, electric traction current supply control rooms and traffic control centres that permits train movement. This does not include those staff employed by a Railway Undertaking who are responsible for management of resources such as train crew or rolling stock.
Competence	The qualification and experience necessary to safely and reliably undertake the task being performed. Experience can be gained as part of the training process.
Dangerous goods	As covered by Directive 2008/68/EC
Degraded operation	Operation resulting from an unplanned event that prevents the normal delivery of train services.
Despatch (= dispatch)	See Train despatch
Driver	As defined in Article 3 of Directive 2007/59/EC.
Exceptional loads	A load carried on a rail vehicle, for example a container, swap body or other traffic where the rail vehicle size and/or axle loading requires special authority for the movement and/or the application of special conditions of travel for all or part of the journey.
Health and Safety Conditions	In the context of this TSI, this refers only to the medical and psychological qualifications required to operate the relevant elements of the subsystem.
Hot axle box	An axle box and bearing that has exceeded its maximum designed operating temperature.
Incident	As defined in Article 3 of Directive 2004/49/EC.
Length of train	Total length of all vehicles over buffers including locomotive(s)
Operating Language	The language or languages used in daily operation an Infrastructure Manager and published in his Network Statement, for the communication of operational or safety related messages between the staff of the Infrastructure Manager and the Railway Undertaking.
Passenger	Person (other than an employee with specific duties on the train) travelling by train or on railway property before or after a train journey.
Performance monitoring	The systematic observation and recording of the performance of the train service and the infrastructure for the purpose of bringing about improvements in the performance of both.
Qualification	The physical and psychological suitability for the task together with the required knowledge.
Real time	The ability to exchange or process information on specified events (such as arrival at a station, passing a station or departure from a station) on the train's journey as they occur.
Reporting point	A point on the trains schedule where reporting of the arrival, departure or passing time is required.

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Term	Definition
Route	The particular section or sections of line
Safety-critical work	Work performed by staff when they control or affect the movement of a vehicle, which could affect the health, and safety of persons.
Staff	Employees working for a Railway Undertaking or an Infrastructure Manager, or their contractors, undertaking tasks as specified in this TSI.
Stopping point	A location identified in the schedule of a train where the train is planned to stop, usually to carry out a specific activity such as allowing passengers to join and leave the train.
Timetable	Document or system that gives details of a train(s) schedule over a particular route.
Timing point	A location identified in the schedule of a train where a specific time is identified. This time may be an arrival time, departure time or in the case of a train not scheduled to stop at that location the passing time.
Traction unit	A powered vehicle able to move itself and other vehicles to which it may be coupled.
Train	A train is defined as (a) traction unit(s) with or without coupled railway vehicles with train data available operating between two or more defined points.
Train despatch	The indication to the person driving the train that all station or depot activities are completed and that, as far as the staff responsible are concerned, movement authority has been granted for the train.
Train crew	Members of the on-board staff of a train, who are certified as competent and appointed by a Railway Undertaking to carry out specific, designated safety related tasks on the train, for example the driver or the guard.
Train preparation	Ensuring that a train is in a fit condition to enter service, that the train equipment is correctly deployed and the formation of the train matches the train's designated pathway. Train preparation also includes technical inspections carried out prior to the train entering service.

Abbreviation	Explanation
AC	Alternating current
CCS	Control-Command and Signalling
CEN	European Committee for Standardisation (Comité Européen de Normalisation)
COTIF	Convention Concerning International Carriage by Rail (Convention relative aux Transports Internationaux Ferroviaires)
CR	Conventional Rail
dB	Decibels
DC	Direct Current
DMI	Driver Machine Interface
EC	European Community
ECG	Electro Cardiogram
EIRENE	European Integrated Railway Radio Enhanced Network
EN	euro-norm
ENE	Energy

▼B

Abbreviation	Explanation
ERA	European Rail Agency
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
EU	European Union
FRS	Functional Requirement Specification
GSM-R	Global System for Mobile Communications — Rail
HABD	Hot Axle Box Detector
Hz	Hertz
IM	Infrastructure Manager
INF	Infrastructure
OPE	Operation and Traffic Management
OSJD	Organisation for Cooperation of Railways
PPV/PPW	Russian abbreviation for Prawila Polzowaniia Wagonami w mejdunarodnom soobqenii = Rules for use of railway vehicles in international traffic
RST	Rolling Stock
RU	Railway Undertaking
SMS	Safety Management System
SPAD	Signal Passed at Danger
SRS	System Requirement Specification
TAF	Telematic Applications for Freight
TEN	Trans-European Network
TSI	Technical Specification for Interoperability
UIC	International Union of Railways (Union Internationale des Chemins de fer)
VKM	Vehicle Keeper Marking

▼B

ANNEX II

The Annex to Decision 2007/756/EC is amended as follows:

(1) Chapter 1 is amended as follows:

(a) The description of the data field 1. 'European Vehicle Number' is replaced by the following:

'numeric identification code as defined in Appendix 6';

(b) Footnote (1) is replaced by the following:

'([1]) not used'.

(c) The description of the data field 2.1 is replaced by the following:

'Member State numeric code as defined in Appendix 6, part 4'.

(d) The description of the data field 11 is replaced by the following:

'Member State numeric code as defined in Appendix 6, part 4'.

(2) In Chapter 2.1, Links with other registers, the explanation regarding VKMR is replaced by the following:

'VKMR: this register is managed by ERA and OTIF in cooperation (ERA for the EU and OTIF for all non-EU OTIF Member States). The keeper is recorded in the NVR. Appendix 6 specifies other global central registers (such as vehicle type codes, interoperability codes, country codes, etc.) to be managed by a 'central body' resulting from cooperation between ERA and OTIF'.

(3) The following Appendix is added:

'*Appendix 6*

PART '0' — VEHICLE IDENTIFICATION

General remarks

This appendix describes the European Vehicle Number and linked marking applied in a visible manner on the vehicle to identify it uniquely and in a permanent manner during operation. It does not describe other numbers or markings eventually engraved or fixed in a permanent manner on the chassis or the main components of the vehicle during its construction.

European Vehicle number and linked abbreviations

Each railway vehicle receives a number consisting of 12 figures (called European Vehicle Number (EVN)) with the following structure:

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Rolling stock group	Interoperability capability and vehicle type [2 figures]	Country in which the vehicle is registered [2 figures]	Technical characteristics [4 figures]	Serial number [3 figures]	Check digit [1 figure]
Wagons	00 to 09 10 to 19 20 to 29 30 to 39 40 to 49 80 to 89 *[details in part 6]*	01 to 99 *[details in part 4]*	0000 to 9999 *[details in part 9]*	000 to 999	0 to 9 *[details in part 3]*
Hauled passenger vehicles	50 to 59 60 to 69 70 to 79 *[details in part 7]*		0000 to 9999 *[details in part 10]*	000 to 999	
Tractive rolling stock and units in a train set in fixed or pre-defined formation	90 to 99 *[details in part 8]*		0000000 to 8999999 *[the meaning of these figures is defined by the Member States, eventually by bilateral or multilateral agreement]*		
Special vehicles			9000 to 9999 *[details in part 11]*	000 to 999	

In a given country, the 7 digits of technical characteristics and serial number are sufficient to identify uniquely a vehicle inside the groups of hauled passenger vehicles and special vehicles ([1]).

Alphabetical markings complete the number:

(a) abbreviation of the country in which the vehicle is registered *(details in part 4)*;

(b) Vehicle Keeper Marking *(details in part 1)*;

(c) abbreviations of the technical characteristics (details in part 12 for the wagons, part 13 for the hauled passenger vehicles).

The European Vehicle Number shall be changed when it does not reflect the interoperability capability or technical characteristics according to this Appendix due to technical modifications of the vehicle. Such technical modifications may require a new placing in service according to Articles 20 to 25 of Directive 2008/57/EC.

PART 1 — VEHICLE KEEPER MARKING

1. **Definition of the Vehicle Keeper Marking (VKM)**

A Vehicle Keeper Marking (VKM) is an alphabetic code, consisting of 2 to 5 letters ([2]). A VKM is inscribed on each rail vehicle, near the European Vehicle Number. The VKM identifies the Vehicle Keeper as registered in a National Vehicle Register.

A VKM is unique and valid in all countries covered by this TSI and all countries that enter into an agreement that involves the application of the system of vehicle numbering and VKM as described in this TSI.

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2. **Format of the Vehicle Keeper Marking**

The VKM is representation of the full name or abbreviation of the vehicle keeper, if possible in a recognisable manner. All 26 letters of the Latina alphabet may be used. The letters in the VKM are written in capitals. Letters that do not stand for first letters of words in the keeper's name may be written in lower case. For checking uniqueness, the letters written in lower case will be taken as written in capitals.

Letters may contain diacritical signs ([3]). Diacritical signs used by these letters are ignored for checking uniqueness.

For vehicles of keepers that reside in a country that does not use the Latin alphabet, a translation of the VKM in its own alphabet may be applied behind the VKM separated from it by a slash-sign ('/'). This translated VKM is disregarded for data-processing purposes.

3. **Provisions about allocation of Vehicle Keeper Markings**

A vehicle keeper can be issued more than one VKM, in case:

— the vehicle keeper has a formal name in more than one language;

— a vehicle keeper has good cause to distinguish between separate vehicle fleets within his organisation.

A single VKM can be issued for a group of companies:

— that belong to single corporate structure (e.g. holding structure);

— that belong to a single corporate structure that has appointed and mandated one organisation within this structure to handle all issues on behalf of all others;

— that has mandated a separate, single legal entity for handling all issues on their behalf, in which event the legal entity is the keeper.

4. **Register of Vehicle Keeper Markings and procedure for allocation**

The register of VKM is public and updated on a real time basis.

An application for a VKM is filed with the applicant's competent national authority and forwarded to the ERA. A VKM can be used only after publication by the ERA.

The holder of a VKM must inform the competent national authority when he ends the use of a VKM, and the competent national authority will forward the information to the ERA. A VKM will then be revoked once the keeper has proved that the marking has been changed on all vehicles concerned. It will not be reissued for 10 years, unless it is reissued to the original holder or at his request to another holder.

A VKM can be transferred to another holder, which is the legal successor to the original holder. A VKM stays valid when the VKM's holder changes his name to a name that does not bear resemblance to the VKM.

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In case of a change of keeper which entails a change of VKM, the vehicles concerned must be marked with the new VKM within three months from the date of registration of the change of keeper in the National Vehicle Register. In case of inconsistency between the VKM marked on the vehicle and the data registered in the NVR, the NVR-registration supersedes.

PART 2

Not used

PART 3 — RULES FOR THE DETERMINATION OF THE CHECK-DIGIT (DIGIT 12)

The check-digit is determined in the following manner:

— the digits in the even positions of the basic number (counting from the right) are taken at their own decimal value;

— the digits in the odd positions of the basic number (counting from the right) are multiplied by 2;

— the sum formed by the digits in even position and by all the digits which constitute the partial products obtained from the odd positions is then established;

— the unit's digit of this sum is retained;

— the complement required to bring the unit's digit to 10 forms the check-digit; should this units digit be nought, then the check-digit will also be nought.

Examples:

1 — Let the basic number be 3 3 8 4 4 7 9 6 1 0 0

Multiplication factor 2 1 2 1 2 1 2 1 2 1 2

6 3 16 4 8 7 18 6 2 0 0

Sum: 6 + 3 + 1 + 6 + 4 + 8 + 7 + 1 + 8 + 6 + 2 + 0 + 0 = 52
The unit's digit of this sum is 2.

The check-digit number will therefore be 8 and the basic number thus becomes the registration number 33 84 4796 100 – 8.

2 — Let the basic number be 3 1 5 1 3 3 2 0 1 9 8

Multiplication factor 2 1 2 1 2 1 2 1 2 1 2

6 1 10 1 6 3 4 0 2 9 16

Sum: 6 + 1 + 1 + 0 + 1 + 6 + 3 + 4 + 0 + 2 + 9 + 1 + 6 = 40
The unit's digit of this sum is 0.

The check-digit number will therefore be 0 and the basic number thus becomes the registration number 31 51 3320 198 – 0.

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PART 4 — CODING OF THE COUNTRIES IN WHICH THE VEHICLES ARE REGISTERED (DIGITS 3-4 AND ABBREVIATION)

The Information relating to third countries is given for information purposes only.

Countries	Alphabetical country code (1)	Numerical country code
Albania	AL	41
Algeria	DZ	92
Armenia	AM	58
Austria	A	81
Azerbaijan	AZ	57
Belarus	BY	21
Belgium	B	88
Bosnia-Herzegovina	BIH	49
Bulgaria	BG	52
China	RC	33
Croatia	HR	78
Cuba	CU (1)	40
Cyprus	CY	
Czech Republic	CZ	54
Denmark	DK	86
Egypt	ET	90
Estonia	EST	26
Finland	FIN	10
France	F	87
Georgia	GE	28
Germany	D	80
Greece	GR	73
Hungary	H	55
Iran	IR	96
Iraq	IRQ (1)	99
Ireland	IRL	60
Israel	IL	95
Italy	I	83
Japan	J	42
Kazakhstan	KZ	27
Kyrgyzstan	KS	59
Latvia	LV	25
Lebanon	RL	98
Liechtenstein	FL	
Lithuania	LT	24

Countries	Alphabetical country code (1)	Numerical country code
Luxembourg	L	82
Macedonia	MK	65
Malta	M	
Moldova	MD (1)	23
Monaco	MC	
Mongolia	MGL	31
Montenegro	MNE	62
Morocco	MA	93
Netherlands	NL	84
North Korea	PRK (1)	30
Norway	N	76
Poland	PL	51
Portugal	P	94
Romania	RO	53
Russia	RUS	20
Serbia	SRB	72
Slovakia	SK	56
Slovenia	SLO	79
South Korea	ROK	61
Spain	E	71
►C1 Sweden	S	74 ◄
Switzerland	CH	85
Syria	SYR	97
Tajikistan	TJ	66
Tunisia	TN	91
Turkey	TR	75
Turkmenistan	TM	67
Ukraine	UA	22
United Kingdom	GB	70
Uzbekistan	UZ	29
Vietnam	VN (1)	32

(1) According to the alphabetical coding system described in Appendix 4 to the 1949 convention and Article 45(4) of the 1968 convention on road traffic.

PART 5

Not used

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PART 6 — INTEROPERABILITY CODES USED FOR WAGONS (DIGITS 1-2)

	1st digit / 2nd digit		0	1	2	3	4	5	6	7	8	9	2nd digit / 1st digit	
		Track Gauge	fixed or variable	fixed	variable	fixed	variable	fixed	variable	fixed	variable	fixed or variable	Track Gauge	
Wagons conform to TSI WAG [a] including section 7.1.2 and all conditions set out in Appendix C	0	with axles	Not to be used	wagons		not to be used [c]						PPV/PPW wagons (variable gauge)	with axles	0
	1	with bogies											with bogies	1
	2	with axles		wagons								PPV/PPW wagons (fixed gauge)	with axles	2
	3	with bogies											with bogies	3
Other wagons	4	with axles [b]	main-tenance related wagons	Other wagons								Wagons with special numbering for technical characteristics not placed in service inside EU	with axles [b]	4
	8	with bogies [b]											with bogies [b]	8
	1st digit / 2nd digit		0	1	2	3	4	5	6	7	8	9	1st digit / 2nd digit	

[a] Commission Regulation [TSI WAG as adopted after the revision].
[b] Fixed or variable gauge.
[c] Except for wagons in category I (temperature-controlled wagons), not to be used for new vehicles authorised placed in service.

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PART 7 — INTERNATIONAL TRAFFIC ABILITY CODES USED FOR HAULED PASSENGER VEHICLES (DIGITS 1-2)

	Domestic traffic	TEN ([a]) and/or COTIF ([b]) and/or PPV/PPW				Domestic traffic or international traffic by special agreement	TEN ([a]) and/or COTIF ([b])	PPV/PPW		
2nd digit 1st digit	0	1	2	3	4	5	6	7	8	9
5	Vehicles for domestic traffic	Fixed-gauge non-air-conditioned vehicles (including car-carrying wagons)	Gauge-adjustable (1435/1520) non-air-conditioned vehicles	Not to be used	Gauge-adjustable (1435/1668) non-air-conditioned vehicles	Historical vehicles	Not to be used ([c])	Fixed-gauge vehicles	Gauge-adjustable (1435/1520) vehicles with change of bogies	Gauge-adjustable (1435/1520) vehicles with gauge-adjustable axles
6	Service vehicles	Fixed-gauge air-conditioned vehicles	Gauge-adjustable (1435/1520) air-conditioned vehicles	Service vehicles	Gauge-adjustable (1435/1668) air-conditioned vehicles	Car-carrying wagons	Not to be used ([c])			
7	Air-conditioned and pressure-tight vehicles	Not to be used	Not to be used	Pressure-tight fixed-gauge air-conditioned vehicles	Not to be used	Other vehicles	Not to be used	Not to be used	Not to be used	Not to be used

([a]) Compliance with the applicable TSIs, see appendix P, part 5.
([b]) Including vehicles, which according to existing regulations carry the digits defined in the present table. COTIF: vehicle compliant with COTIF regulation in force at the moment of placing in service
([c]) Excepted for coaches with fixed gauge (56) and adjustable gauge (66) already in service, not to be used for new vehicles

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PART 8 — TYPES OF TRACTIVE ROLLING STOCK AND UNITS IN A TRAIN SET IN FIXED OR PRE-DEFINED FORMATION (DIGITS 1-2)

The first digit is '9'.

If the second digit describes the type of tractive stock, following coding is mandatory:

Code	General vehicle type
0	Miscellaneous
1	Electric locomotive
2	Diesel locomotive
3	Electric multiple-unit set (high speed) [power car or trailer]
4	Electric multiple-unit set (except high speed) [power car or trailer]
5	Diesel multiple-unit set [power car or trailer]
6	Specialised trailer,
7	Electric shunting engine
8	Diesel shunting engine
9	Special vehicle

PART 9 — STANDARD NUMERICAL MARKING OF WAGONS (DIGITS 5 TO 8)

Part 9 indicates the numerical marking associated to the main technical characteristics of the wagon and it is published on the ERA website (www.era.europa.eu).

An application for a new code is filed with the registering entity (as referred to in Decision 2007/756/EC) and sent to the ERA. A new code can be used only after publication by the ERA.

PART 10 — CODES FOR THE TECHNICAL CHARACTERISTICS OF THE HAULED PASSENGER STOCK (DIGITS 5-6)

Part 10 is published on the ERA website (www.era.europa.eu).

An application for a new code is filed with the registering entity (as referred to in Decision 2007/756/EC) and sent to the ERA. A new code can be used only after publication by the ERA.

PART 11 — CODES FOR THE TECHNICAL CHARACTERISTICS OF THE SPECIAL VEHICLES (DIGIT 6 TO 8)

Part 11 is published on the ERA website (www.era.europa.eu).

An application for a new code is filed with the registering entity (as referred to in Decision 2007/756/EC) and sent to the ERA. A new code can be used only after publication by the ERA.

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PART 12 — LETTER MARKING FOR WAGONS EXCLUDING ARTICULATED AND MULTIPLE WAGONS

Part 12 is published on the ERA website (www.era.europa.eu).

An application for a new code is filed with the registering entity (as referred to in Decision 2007/756/EC) and sent to the ERA. A new code can be used only after publication by the ERA.

PART 13 — LETTER MARKING FOR HAULED PASSENGER STOCK

Part 13 is published on the ERA website (www.era.europa.eu).

An application for a new code is filed with the registering entity (as referred to in Decision 2007/756/EC) and sent to the ERA. A new code can be used only after publication by the ERA.

([1]) For special vehicles, the number has to be unique in a given country with the first digit and the 5 last digits of the technical characteristics and serial number.

([2]) For NMBS/SNCB, the use of an encircled single letter B can be continued.

([3]) Diacritical marks are ‘accent-signs’, such as in À, Ç, Ö, Č, Ž, Å etc. Special letters such as Ø and Æ will be represented by a single letter; in tests for uniqueness Ø is treated as O and Æ as A.’