EUROPEAN
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FOR RAILWAYS

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RECOMMENDATION 006REC1078
OF
THE EUROPEAN UNION AGENCY FOR RAILWAYS

on

the revision of the technical specification for interoperability relating to 'safety in railway tunnels'

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THE EXECUTIVE DIRECTOR

HAVING REGARD TO Regulation (EU) 2016/796 of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Railways and repealing Regulation (EC) No 881/2004, hereafter referred to as the 'Agency Regulation', in particular Articles 4 and 5 thereof,

HAVING REGARD TO Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system (Recast), hereafter referred to as the 'Interoperability Directive', in particular Articles 4 and 5 thereof,

HAVING REGARD TO Commission Delegated Decision (EU) 2017/1474 of 8 June 2017 supplementing Directive (EU) 2016/797 of the European Parliament and of the Council with regard to specific objectives for the drafting, adoption and review of technical specifications for interoperability, hereafter referred to as the 'Delegated Decision on TSIs', in particular Articles 3 and 12 thereof,

Whereas

1. In accordance with Article 5 of the Agency Regulation, a working party has been established for making a proposal for a recommendation as regards the revision of the TSI on Safety in Railway Tunnels (SRT TSI) according to the Interoperability Directive and Delegated Decision on TSIs

2. This working party has completed its work in October 2018, and as a result, the Agency has finalised the corresponding amendments to the SRT TSI.

3. A consultation of the social partners and rail customers, as provided for in Articles 6 and 7 of the Agency Regulation, has been carried out.

4. An impact assessment in accordance with Article 5 of the Interoperability Directive has been carried out during the revision of this TSI. The proposed amendments are covered by that impact assessment.

HAS ADOPTED the following recommendation:

1. The TSI on Safety in Railway Tunnels should be revised as set out in Annex of this recommendation.

This recommendation is addressed to the European Commission.

Valenciennes, 14.11.2018

Josef DOPPELBAUER
Executive Director

Annex: Amendments to the Technical Specification for Interoperability on Safety in Railway Tunnels

Annex: Amendments to the technical specification for interoperability relating to 'safety in railway tunnels'

The Annex to Regulation (EU) 1303/2014 is amended as follows:

(1) in Sections 1.1, 3, 4.1, 4.4 and 6.2.5 the references to "Directive 2008/57/EC" are replaced by references to "Directive (EU) 2016/797";

(2) in section 1.1.1(a), "European Union rail network" is replaced by "network of the Union rail system";

(3) in section 1.1.3.1"European Union rail" is replaced by "network of the Union rail";

(4) section 1.1.4 is replaced as follows:

"1.1.4 Risk scope

1.1.4.1. Risks covered by this TSI

(a) This TSI covers only specific risks to the safety of passengers and on-board staff in tunnels for the subsystems above.

(b) Where a risk analysis comes to the conclusion that other tunnel incidents might be of relevance, specific measures to deal with these scenarios shall be defined.

1.1.4.2. Risks not covered by this TSI

(a) Risks not covered by this TSI are as follows:

(1) Health and safety of staff involved in maintenance of the fixed installations in tunnels.

(2) Financial loss due to damage to structures and trains, and consequently the losses resulting from non-availability of the tunnel for repairs.

(3) Trespass into the tunnel through the tunnel portals.

(4) Terrorism, as a deliberate and premeditated act which is designed to cause wanton destruction, injury and loss of life.

(5) Risks for people in the neighbourhood of a tunnel where collapse of the structure could have catastrophic consequences."

(5) section 1.2 is replaced as follows:

"1.2 Geographical scope
The geographical scope of this TSI is the network of the Union rail system as described in Annex I of Directive (EU) 2016/797 with the exclusion of the cases referred to in Section 1(3) and 1(4) of Directive (EU) 2016/797";

(6) "fire fighting point(s)" is replaced by "evacuation and rescue point(s)" in sections 1.1.1(b), 2.2.1(b), 2.4(c), 4.2.1.7, 4.2.3, 4.4.1(c), 4.4.2(a), 4.4.6;

(7) In point (b) of Section 2.2.3, the text "panic and to" is deleted;

(8) In point (c) (1) of Section 2.3, the text "inside the tunnel" is deleted;

(9) point (f) of Section 2.3 is replaced as follows:

"If the expectations of the emergency response services expressed in emergency plans go beyond the assumptions described above, the need for additional measures or tunnel equipment can be considered.";

(10) in Section 2.4, a definition (b1) "Final place of safety" is added as follows:

"(b1) Final place of safety: the final place of safety is the place where passengers and staff will no longer be impacted by the effects of the incident (e.g. smoke opacity and toxicity, temperature). It is the termination point of the evacuation.";

(11) point 2.4(c) is replaced as follows:

"(c) Evacuation and rescue point: an evacuation and rescue point is a defined location, inside or outside the tunnel, where fire fighting equipment can be used by the emergency response services and where passengers and staff can evacuate from a train.";

(12) a definition (g) "CSM on risk assessment" is added as follows:

"(g) CSM on risk assessment: this term is used to designate the annex 1 of the Commission Implementing Regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009"

(13) section 3 is replaced as follows:

"3 Essential requirements

(a) The following table indicates basic parameters of this TSI and their correspondence to the essential requirements as set out and numbered in Annex III to Directive (EU) 2016/797.

(b) For meeting the essential requirements, the corresponding parameters of sections 4.2.1, 4.2.2 and 4.2.3 shall apply.

3.1 Infrastructure and energy subsystems

(a) In order to meet the essential requirement 'Safety' applying to the Infrastructure and Energy subsystems, the CSM on risk assessment may be applied as an alternative to the corresponding parameters of sections 4.2.1 and 4.2.2.

(b) Accordingly, for the risks identified in point 1.1.4 and the scenarios listed in point 2.2, the risk can be assessed by:

(1) a comparison with a reference system,

(2) an explicit risk estimation and evaluation.

(c) For meeting the essential requirements other than 'Safety', the corresponding parameters of sections 4.2.1 and 4.2.2 shall apply.

Element of the infrastructure sub-system	Ref. Clause	Safety	Reliability Availability	Health	Environmental protection	Technical compatibility	Accessibility
Prevent unauthorised access to emergency exits and technical rooms	4.2.1.1.	2.1.1					
Fire resistance of tunnel structures	4.2.1.2.	1.1.4 2.1.1					
Fire reaction of building material	4.2.1.3.	1.1.4 2.1.1		1.3.2	1.4.2		
Fire detection	4.2.1.4.	1.1.4 2.1.1					
Evacuation facilities	4.2.1.5.	1.1.5 2.1.1					
Escape walkways	4.2.1.6.	2.1.1					
Evacuation and rescue points	4.2.1.7 except (b)	2.1.1					
Evacuation and rescue points	4.2.1.7 (b)					1.5	
Emergency communication	4.2.1.8.	2.1.1					
Electricity supply for emergency response services	4.2.1.9	2.1.1					
Reliability of electrical systems	4.2.1.10	2.1.1					

Element of the energy sub-system	Ref. Clause	Safety	Reliability Availability	Health	Environmental protection	Technical compatibility	Accessibility
Sectioning of contact line	4.2.2.1.	2.2.1					
Earthing of contact line	4.2.2.2.	2.2.1					

3.2 Rolling stock subsystem

(a) For meeting the essential requirements, the corresponding parameters of section 4.2.3 shall apply.

Element of the rolling stock sub-system	Ref. Clause	Safety	Reliability Availability	Health	Environmental protection	Technical compatibility	Accessibility
Measures to prevent fire	4.2.3.1	1.1.4 2.4.1		1.3.2	1.4.2		
Measures to detect and control fire	4.2.3.2	1.1.4 2.4.1					
Requirements related to emergencies	4.2.3.3	2.4.1	2.4.2			1.5 2.4.3	
Requirements related to evacuation	4.2.3.4	2.4.1					

(14) in section 4.1, "European Union rail system" is replaced by "Union rail system";

(15) section 4.2.1.2(b) is deleted;

(16) section 4.2.1.3 is replaced as follows:

"4.2.1.3 This specification applies to all tunnels.

(a) This specification applies to construction products and building elements inside tunnels. These products shall fulfil the requirements of Commission Regulation (EU)2016/3641:

(1) Tunnel building material shall fulfil the requirements of classification A2

(2) Non-structural panels and other equipment shall fulfil the requirements of classification B.

(3) Exposed cables shall have the characteristics of low flammability, low fire spread, low toxicity and low smoke density.

(b) Materials that would not contribute significantly to a fire load shall be listed. They are allowed to not comply with the above.";

(17) section 4.2.1.4(a) is replaced as follows:

"(a) Fire in technical rooms shall be detected in order to alert the infrastructure manager.";

(18) section 4.2.1.5.2(b3) is deleted;

(19) in section 4.2.1.5.4, the terms "on escape routes" and "as low as possible," are deleted and point (c) is replaced as follows:

"(c) Autonomy and reliability: an alternative electricity supply shall be available for an appropriate period of time after failure of the main supply. The time required shall be consistent with the evacuation scenarios and reported in the Emergency Plan."

(20) In section 4.2.1.5.5, point (f), the term "cross-passages" is replaced by "cross-passage";

(21) in section 4.2.1.6 point (a), the term "top" is replaced by "bottom";

(22) section 4.2.1.7 is modified as follows:

(a) in point (a1) the terms "length of the train" are replaced by the terms "length of the passenger train";

(b) in point (a2) the terms "safe space" are replaced by "open air area" and the terms "along a safe space" are deleted;

(23) table in 4.2.1.7 is replaced as follows:

Rolling stock category according to paragraph 4.2.3	Maximum distance from the portals to an evacuation and rescue point and between evacuation and rescue points
Category A	5 km
Category B	20 km

(24) in point 4 of point (c) of section 4.2.1.7 is replaced as follows:

"It shall be possible to switch off and earth the contact line, either locally or remotely";

(25) a new section 4.2.1.9 is added with the following text:

"4.2.1.9 Electricity supply for emergency response services

This specification applies to all tunnels of more than 1 km in length.

(a) The electricity supply system in the tunnel shall be suitable for the emergency response services equipment in accordance with the emergency plan for the tunnel. Some national emergency response services groups may be self-sufficient in relation to electricity supply. In this case, the option of not providing electricity supply facilities for the use of such groups may be appropriate. Such a decision, however, must be described in the emergency plan".

(26) a new section 4.2.1.10 is added with the following text:

"4.2.10 Reliability of electrical systems

This specification applies to all tunnels of more than 1 km in length.

(a) Electrical systems identified by the Infrastructure Manager as vital to the safety of passengers in the tunnel shall be kept in use as long as necessary according to the evacuation scenarios considered in the emergency plan.

(b) Autonomy and reliability: an alternative electricity supply shall be available for an appropriate period of time after failure of the main supply. The time required shall be consistent with the evacuation scenarios considered and included in the emergency plan".

(27) a new section 4.2.1.11 is added with the following text:

"4.2.1.11. Communication and lighting at switching locations

This specification applies to all tunnels of more than 1 km in length.

(a) When the contact line is divided into sections that can be locally switched, a means of communication and lighting shall be provided at the switching location".

(28) section 4.2.2.1 is replaced as follows:

"4.2.2.1. Sectioning of contact line

This specification applies to all tunnels of more than 1 km in length.

(a) The traction power supply system in tunnels may be divided into sections.

(b) In such case, it shall be possible to switch off each section of the contact line, either locally or remotely".

(29) in section 4.2.2.2, the term "Overhead line or conductor rail earthing" is replaced by "Earthing of contact line". The point c and the term "operations" in point b are deleted.

(30) section 4.2.2.3 is deleted;

(31) section 4.2.2.4 is deleted;

(32) section 4.2.2.5. is deleted;

(33) in the table in section 4.3.1 the reference to clause "4.2.2.4(a)" is replaced by a reference to clause "4.2.1.3";

(34) in the table in section 4.3.2 the terms "specific elements for train crew and auxiliary staff" and "4.6.3.2.3" are deleted;

(35) section 4.4.2 is replaced as follows:

"These rules apply to tunnels of more than 1 km in length

(a) An emergency plan shall be developed under the direction of the Infrastructure Manager(s), in co-operation with the emergency response services and the relevant authorities for each tunnel. Station managers shall be equally involved if one or more stations are used as a safe area or an evacuation and rescue point. In case the emergency plan concerns an existing tunnel, Railway Undertakings already operating in the tunnel must be consulted. In case the emergency plan concerns a new tunnel, Railway Undertakings planning to operate in the tunnel may be consulted..

(b) The emergency plan shall be consistent with the self-rescue, evacuation, fire-fighting and rescue facilities available.

(c) Detailed tunnel-specific incident scenarios adapted to the local tunnel conditions shall be developed for the emergency plan.

(d) Once developed, the emergency plan shall be communicated to Railway Undertakings intending to use the tunnel".

(36) section 4.4.4. is replaced as follows:

"4.4.4. Switching off and Earthing procedures

These rules apply to all tunnels.

(a) In the case it is required to switch off the traction power supply system the infrastructure manager shall make sure that relevant sections of the contact line have been switched off, and inform the emergency response services before they enter the tunnel or a section of the tunnel.

(b) It is the responsibility of the infrastructure manager to switch off the traction power supply.

(c) Procedures and responsibilities for earthing of the contact line shall be defined between the Infrastructure Manager and the emergency response services, and reported in the emergency plan. Provision shall be made for switching off the section in which the incident has taken place".

(37) In Section 4.4.6.(a) the text "in the Register of Infrastructure defined in clause 4.8.1 and" is deleted

(38) In Section 4.4.6.(c) the text "panic and" is deleted;

(39) Section 4.8 is deleted;

(40) Section 6.2.5 is modified as follows:

"Article 18(3)" is replaced by "Article 15(4)";

"a notified body" is replaced by "the applicant"

(41) Section 6.2.6 is replaced as follows:

"6.2.6. Assessment of conformity for the Safety requirements applying to the Infrastructure and Energy subsystems

(a) This clause applies when a comparison with a reference system or an explicit risk estimation is used to meet the essential requirement 'Safety' applying to the Infrastructure and Energy subsystems.

(b) In such case, the applicant shall:

(1) determine the risk acceptance principle, the methodology for the risk assessment, the safety requirements to be fulfilled by the system and the demonstration that they are fullfilled;

(2) determine the risk acceptance levels with the relevant national authority/authorities;

(3) designate the independent assessment body as defined in the CSM on risk assessment. This assessment body can be the notified body selected for the Infrastructure or Energy subsystem if recognised or accredited as per Section 7 of the CSM on risk assessment.

(c) A safety assessment report shall be provided in compliance with the requirements defined in the CSM on risk assessment.

(d) The EC certificate issued by the notified body shall explicitly mention the risk acceptance principle used for meeting the 'Safety' requirement of this TSI. It shall also mention the methodology applied for the risk assessment and the risk acceptance levels."

(42) Section 6.2.7 is modified as follows:

Section 6.2.7.1. is deleted: "Prevent unauthorised access to emergency exits and equipment rooms The assessment shall confirm that: (a) Emergency exit doors to the surface and doors to technical rooms are provided with suitable locks (b)The locks provided are consistent with the overall strategy for security for the tunnel and adjacent infrastructure (c) Emergency exits are not lockable from the inside and shall be able to be opened by evacuating persons (d) Access arrangements are in place for the emergency response services" is replaced by "not used"

Section 6.2.7.2. (a)(2) is deleted

In section 6.2.7.3. (a), the term "4.2.1.3 (c)" is replaced by "4.2.1.3 (b)"

Section 6.2.7.4. (b) is deleted

Section 6.2.7.5. is replaced by the following text:

"6.2.7.5. Emergency lighting in upgraded/renewed tunnels

In case of upgraded/renewed tunnels as required by clause 7.2.2.1, the assessment consists in the verification of the existence of the lighting. It is not necessary to apply detailed requirements."

In section 6.2.7.6, the term "installations" is replaced by "systems" and the reference to clause "4.2.2.5" is replaced by a reference to clause "4.2.1.11."

(43) Section 7(b) is modified as follows:

The terms "suitable for safe integration in accordance with Article 15(1) of Directive 2008/57/EC with all non-TSI compliant tunnels within the geographical scope of this TSI." are replaced by "technically compatible with all non-TSI compliant tunnels within the geographical scope of this TSI in accordance with Article 21(3) of Directive (EU) 2016/797.";

(44) Section 7.1.1.(b) is modified as follows:

"In the latter case Article 24 and 25 of Directive 2008/57/EC apply." is deleted;

(45) Section 7.2.2 is replaced as follows:

"7.2.2. Upgrade and renewal measures for tunnels

In case of the upgrade or renewal of a tunnel,according to Article 15(7) and Annex IV of Directive (EU) 2016/797, the notified body issues certificates of verification for those parts of the subsystem composing the tunnel under the scope of the upgrade or renewal.

7.2.2.1. Upgrade or renewal of a tunnel

(a) A tunnel is considered to be or upgraded or renewed in the context of this TSI when any major modification or substitution work are carried out on a subsystem (or part of it) composing the tunnel.

(b) Assemblies and components that are not included in the scope of a particular upgrade or renewal programme do not have to be made compliant at the time of such a programme.

(c) When upgrading or renewal works are carried out, the following parameters apply if they are in the scope of work:

4.2.1.1. Prevent unauthorised access to emergency exits and technical rooms

4.2.1.3. Fire reaction of building material

4.2.1.4. Fire detection in technical rooms

4.2.1.5.4 Emergency lighting: when provided, it is not necessary to apply detailed requirements

4.2.1.5.5 Escape signage

4.2.1.8. Emergency communication

(d) The tunnel emergency plan shall be revised.

7.2.2.2. Extension of a tunnel

(a) A tunnel is considered to be extended in the context of this TSI when its geometry is affected (e.g. extension in length, connection to another tunnel).

(b) When a tunnel extension is carried out, then the following measures shall be implemented for assemblies and components included in the extension. For their application, the tunnel length to consider is the total tunnel length after extension:

4.2.1.1. Prevent unauthorised access to emergency exits and technical rooms

4.2.1.2. Fire resistance of tunnel structures

4.2.1.3. Fire reaction of building material

4.2.1.4. Fire detection in technical rooms

4.2.1.5.4 Emergency lighting

4.2.1.5.5 Escape signage

4.2.1.6. Escape walkways

4.2.1.8. Emergency communication

4.2.1.9. Electricity supply for emergency response services

4.2.1.10. Reliability of electrical systems

4.2.1.11 Communication and lighting at switching locations

4.2.2.1. Sectioning of contact line

4.2.2.2. Earthing of contact line

(c) The CSM on risk assessment shall be implemented as described in point 6.2.6 for defining the relevance of applying the other measures of clause 4.2.1.5 and the measures of clause 4.2.1.7 to the complete tunnel resulting from the extension: when it is not economically feasible to fulfil the TSI requirements for the total length of the resulting tunnel, the modifications could be accepted if it is evident that a basic parameter is improved in the direction of the TSI defined performance.

(d) When applicable, the tunnel emergency plan shall be revised.";

(46) Table of appendix B is replaced as follows:

Characteristics to be assessed	Project phase		Particular assessment procedures
	Design review	Assembly before putting into service	
	1	2	3
4.2.1.1. Prevent unauthorised access to emergency exits and technical rooms	X	X	
4.2.1.2. Fire resistance of tunnel structures	X		6.2.7.2
4.2.1.3. Fire reaction of building material	X		6.2.7.3
4.2.1.4. Fire detection in technical rooms	X	X	
4.2.1.5. Evacuation facilities	X	X	6.2.7.4 6.2.7.5
4.2.1.6. Escape walkways	X	X	
4.2.1.7 Evacuation and rescue points	X	X	
4.2.1.8 Emergency communication	X		
4.2.1.9. Electricity supply for emergency response services	X		
4.2.1.10. Reliability of electrical systems	X		6.2.7.6
4.2.2.1. Sectioning of contact line	X	X	
4.2.2.2. Earthing of contact line	X	X	

EUROPEAN UNION AGENCY FOR RAILWAYS

Making the railway system work better for society.

ACCOMPANYING REPORT 006REC1078/ACR TO THE RECOMMENDATION OF THE EUROPEAN UNION AGENCY FOR RAILWAYS

on

the revision of the technical specification for interoperability relating to 'safety in railway tunnels'

Disclaimer:

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

Contents

1. Introduction

With the Delegated Decision on TSIs' [8] that entered into force on September 4th, 2017, the European Commission requested the Agency to set up working parties for revising all TSIs. In particular, the TSI on Safety in Railway Tunnels (SRT TSI [1]) had to be reviewed to take into account:

- the requirements set out in Articles 4.3 (h) and 4.3 (I) of the Interoperability Directive (EU) 2016/797 [5]
- the common objectives set out in Article 3 of the Delegated Decision on TSIs;
- the specific objectives applicable to the SRT TSI set out in Article 12 of the Delegated Decision on TSIs.

Accordingly, the Agency launched the working party for revising the TSI on Safety in RailwayTunnels which scope included the following subsystems:

- Infrastructure
- Energy
- Operation

The scope didn't include:

- Rolling Stock subsystem, for which the parameters have been transferred in the LOC&PAS TSI,
- On-board CCS equipment as the applicable requirements are also transferred in the LOC&PAS TSI.

The objective of the project was to issue a recommendation and associated documents aligning the SRT TSI with the 4th Railway Package, in accordance with Art. 4.3 of the Interoperability Directive and with Art. 3 and Art. 12 of the Delegated Decision on TSIs.

The present report is the report accompanying that recommendation numbered 006REC1078.

2. Working Party

2.1. Composition of the Working Party

The following organisations answered the call for interest to participate to the working party for the revision of the SRT TSI and appointed the following members and deputies:

Organisation	Member	Deputy 1	Deputy 2
CER	Annalisa Pranno	Klaus Kruse	Federica Sandrone
CER	Dietmar Zierl	Kees Ellerbroek	Eric Jourdain
EIM	Otto Bach Ulstrup	Michel Begneu	Tore Telstad
EIM	Hampus Mansson	Javier Moreno Colona	Jean-Marc Pourchier
ERFA	Colette Delliaux		
FEDECRAIL	Bruno Fleury		
NB-Rail	Andreas Kainz	Ioannis Bakas	
NB-Rail	Harald Hiltel		
NSA AT	Thomas Helnwein	Johannes Brunner	
NSA CT	Steve Demetriou		
NSA DE	Sabine Hennigs		
NSA ES	Antonio Perez Corral	Julian Santos Mesa	
NSA FI	Jouni Karhunen	Matti Polvi	
NSA FR	Morgan Poirier	Frédéric Lisiecki	
NSA FR	Jean-Pascal Declerck		
NSA IT	Marco Poggi	Luigi Tatarelli	

NSA NO	Liz Stordahl	Geir Hagbø	
NSA RO	Marcel Barbu	Marian Zaharia	
NSA SE	Björn Södergren		
NSA SK	Mikulas Sedlak		
NSA SL	Robert Švajgl		
UITP	Peter Schollmeier		
UNIFE	Oliver Kemmann	Michael Klinger	
UNIFE	Jean-Jacques Dindeleux		

2.2. Meetings

The following meetings were organized in ERA premises in Lille:

- Meeting 1 11/01/2018
- Meeting 2 21/02/2018
- Meeting 3 12/04/2018
- Meeting 4 23/05/2018
- Meeting 5 04/07/2018
- Meeting 6 12/09/2018
- Meeting 7 24/10/2018

2.3. Mandate for the revision and tasks of the Working Party

2.3.1. Interoperability Directive

Article 4 of the Interoperability Directive lists the content of TSIs and states in particular that each TSI shall:

> *(h) indicate the provisions applicable to the existing subsystems and vehicles, in particular in the event of upgrading and renewal and, in such cases, the modification work which requires an application for a new authorisation;*

For vehicles, this article was covered by the Working Parties in charge of the revision of the LOC&PAS TSI and of the WAG TSI. For fixed installation, this topic was discussed by the SRT Working Party.

2.3.2. Delegated Decision on TSIs

2.3.2.1. Common objectives

Article 3 of the DD on TSIs lists the common specific objectives for revising the TSIs. Not all points are relevant for the SRT TSI. Only the following were discussed with the Working Party:

> *3. TSIs shall be reviewed where appropriate to ensure the right balance between rule-based and risk-based approaches.*
>
> *5. The TSIs shall, where appropriate, include provisions which:*
>
> *(b) take into account the developments of the Union railway system and related research and innovation activities, and integrate them when they reach the appropriate level of maturity;*
>
> *(i) take into account the sector's best practice and review the choice of modules prescribed in the procedures for conformity assessment of interoperability constituents and subsystems;*

2.3.2.2. Specific objectives

Article 12 of the DD on TSIs gives the specific objectives for the revision of the SRT TSI:

1. The operational requirements of Regulation (EU) No 1303/2014 ('SRT TSI') shall be revised in view of harmonisation of the evaluation of evacuation capability, for instance in relation to the distance between two lateral or vertical exits.

2. Provisions on communication between on-board staff on one side and infrastructure manager and emergency services on the other side shall be included where appropriate.

2.3.3. Relevant Technical Opinions and Advices

The Agency published the Technical Opinion ERA/OPI/2014-6 in 2014 to clarify some aspects of the SRT TSI 2014 about the assessment of electrical cables, in particular that the NoBo of the subsystem Energy was in charge of the assessment, even for cables that do not belong to the Energy subsystem stricto sensu. The Technical Opinion is available on the Agency website (Question and clarification from NB Rail - TSI SRT Subsystem Energy - QC-ENE-006)

The Agency also drafted the Technical Opinion ERA/OPI/2018-2 during the revision of the SRT TSI, on potentially excessive reaction to fire requirements for exposed cables in tunnels. The backgound and details of this Technical Opinion are given in paragraph 4.3.1. The Technical Opinion is available on the Agency website (ERA/OPI/2018-2 - Potentially excessive reaction to fire requirements for exposed cables in tunnels)

These opinions were considered by the Working Party.

2.3.4. Return of experience of the TSI users

Stakeholders were invited to provide comments and requests for changes on the basis of their return of experience with the TSI.

3. Outputs of the working party

3.1. Evolution towards a risk-based approach for fixed installations

According to the Article 3(3) of the DD on TSIs and further to a request from CER, the Working Party considered the possible evolution towards a risk-based approach for the fixed installations. After discussion, the following principles were retained:

- 'Safety' is one of the essential requirements that shall be fulfiled by a subsystem;
- The CSM-RA [2] lists the following risk acceptance principles for the evaluation of the risk acceptability of a system:
  - the application of a code of practice
  - a comparison with similar systems
  - an explicit risk estimation
- These risk acceptance principles can be used to fulfil the essential requirement 'Safety' for the fixed installation subsystems

According to these principles, the chapter 3 of the SRT TSI has been amended to explain that the CSM-RA may be applied as an alternative to the basic parameters of sections 4.2.1 and 4.2.2 of the TSI corresponding to the essential requirement 'Safety' and that, for the risks identified in point 1.1.4 and the scenarios listed in point 2.2 of the TSI, the risk can be assessed by a comparison with a reference system or an explicit risk estimation and evaluation (being understood that the basic parameters of sections 4.2.1 and 4.2.2 of the TSI represent the code of practice).

A paragraph has been added in section 6 explaining that, when applying the CSM-RA, the applicant shall:

- determine the risk acceptance principle, the methodology for the risk assessment, the safety requirements to be fulfilled by the system and the demonstration that they are fullfilled
- determine the risk acceptance levels with the relevant national authoritie(s)
- designate the independent assessment body

The EC certificate issued by the notified body for the subsystem concerned shall explicitly mention the risk acceptance principle used for meeting the 'Safety' requirement of the TSI. It shall also mention the methodology applied for the risk assessment and the risk acceptance levels.

The use of the CSM-RA for a fixed subsystem shall, in no case, lead to additional requirements on top of the TSI ones for the rolling stock intended to be operated in the tunnel.

3.2. Other objectives given in the mandate

3.2.1. Harmonisation of the evaluation of evacuation capability

According to the evolution towards a risk-based approach described in 3.1, the criteria for the risk acceptance (methodology, requirements, level to reach) remain the responsibility of the applicant with the relevant national authorities.

The Agency considered the possibility to harmonise some of the criteria used for the risk assessment, and in particular those linked to the evacuation of passengers from a train in a tunnel. Several contributions were provided from:

- CER who made a presentation of the regulation applicable in Italy
- NSA FR who provided :
    - a list of criteria that the French Center for Tunnel Studies recommends to consider for walking speed and survivability conditions for performing risk assessment in road tunnels
    - the criteria applicable to stations of public transport according to the « Arrêté du 24 décembre 2007 » about fire safety rules in stations of public transport
- CTSA who provided a report on a Specialised research on evacuations of passenger trains in the Channel Tunnel and an article on the development of new evacuation procedures for the Channel Tunnel

The Agency also studied the case of road tunnels, for which a Directive was issued in 2004 [3]. Article 13 of that Directive requires that:

1. Risk analyses, where necessary, shall be carried out (...)
2. Member States shall ensure that, at national level, a detailed and well-defined methodology, corresponding to the best available practices, is used and shall inform the Commission of the methodology applied (...)
3. By 30 April 2009 the Commission shall publish a report on the practice followed in the Member States. Where necessary, it shall make recommendations for the adoption of a common harmonised risk analysis methodology.

The Agency had access to the mentioned report. After analysing several national practices, the report concludes in the absence of need for harmonisation due to the existence of many valuable risk analysis methodologies that can be used according to the objectives pursued and the amount of data available.

Similarly, the Agency proposed to the Working Party not to discuss this aspect in details in the context of the limited revision. The harmonisation of the methodology for risk analysis and, as a consequence, the harmonisation of the parameters for the evaluation of how passengers evacuate from a train in a tunnel, is an objective that is too ambitious for this limited revision of the SRT TSI. It could be covered by a specific working group, not necessarily limited to railway.

3.2.2. Provisions on communication between on-board staff on one side and infrastructure manager and emergency services on the other side

Working Party members were questioned about this specific point mentioned in the Article 12 of the DA on TSIs. However, this didn't result in any change of the TSI text because, as underlined by CER, all requirements dealing with the emergency services should be treated by national rules.

Whereas several participants consider that some provisions about communication between on-board staff and the IM could be considered in the emergency plan, no tangible proposal was made.

3.2.3. Review of the procedures for conformity assessment

The review of the procedures for conformity assessment will be the subject of a specific study by the Agency, covering all TSIs. Regarding the SRT TSI specifically, the list of parameters to assess at the assembly before putting into service has been revised for the infrastructure and energy subsystems.

In particular, an assessment at the assembly before putting into service has been added for the following parameters:

- 4.2.1.2. Fire resistance of tunnel structures
- 4.2.1.4. Fire detection in technical rooms
- 4.2.1.5. Evacuation facilities
- 4.2.1.6. Escape walkways
- 4.2.1.7. Evacuation and rescue points

Those subsystem characteristics have to be assessed before putting into service because there is no certainty that no change has been brought to the approved design during the realisation phase. However, it has also been stated that the application guide should clarify what is expected from NoBos when assessing those parameters on site.

3.2.4. Upgrading and renewal for fixed installations

The cases of an upgrade or a renewal of a tunnel have been detailed and a specific part about tunnel extension has been added. Return of experience shows that the cases of tunnel extensions are problematic as the result of an extension is somehow a new tunnel which does not fulfil all requirements of the TSI; this is due to its existing section that can represent a more or less important part of the extended tunnel length.

The minimum requirements applying to the extension have been clarified, but not the requirements applying to the resulting extended tunnel. There can be too many possible configurations: for instance accesses to safe areas may be required for a 0.5km tunnel extended to 3km, but not for a 2.5km extended to 3km. Consequently, some decisions on the application of the TSI remain to be taken at project level with the application of the CSM-RA.

3.3. Other outputs

3.3.1. Reaction to fire requirements for exposed cables in tunnels

During the activities of the Working Party, the Commission was notified by EIM of a deficiency in the SRT TSI 2014 relative to the requirements on the reaction to fire of exposed cables in the tunnels. The commission requested the Agency to draft a technical opinion. The Opinion was discussed with the WP members, NSAs and Representative Bodies were consulted. The Opinion was presented to the RISC in June 2018 and published on the Agency website on 9 July 2018.

In summary, the Agency considers that the introduction of the requirement for class B2ca, s1a, a1 cables in the SRT TSI 2014 was an error resulting in excessively strict requirements considering the SRT TSI risk scenarios. Instead, given the absence of any influence on interoperability and given that the Construction Product Regulation [4] does not require any specific class for a particular application, the requirement sould be functional.

The proposed revision reintroduces the text of the TSI SRT from 2008, requiring cables with characteristics of low flammability, low fire spread, low toxicity and low smoke density. It will be a task of the applicant to determine the most suitable class in accordance with national regulations when they exist, or on the basis of a risk analysis. The class needs not to be unique for a given tunnel: according to the emergency scenarios, several classes can be considered for diferent tunnel locations.

This point raised most of the comments during the public consultation on the revision of the TSI.

3.3.2. Definitions, terminology, clarifications and scope

The TSI has been reviewed by experts in electrical systems so as to ensure that the terminology was correct. As a result, several changes were made to the wording relative to electrotechnical systems (e.g. 'contact line' replaces 'overhead line or conductor rail', 'electricity supply' replaces 'power supply', etc).

The list of the main changes brought to the SRT TSI is given in the annex 4 of this document.

4. Outputs of the public consultation

A public consultation was organised between July 17th and October 16th 2018. The following organisations responded to the consultation:

1. London Fire Brigade
2. CER
3. EIM
4. NSA Switzerland
5. Dutch Institute for Safety IFV
6. Europacable – European association of cable manufacturers
7. Cablebel – Belgian association of cable manufacturers
8. Sycabel – French association of cable manufacturers
9. Facel – Spanish association of cable manufacturers
10. Fedet – Dutch association of cable manufacturers
11. ANIE – Italian association of cable manufacturers
12. ZVEI – German association of cable manufacturers
13. Leoni – Swiss cable manufacturer
14. TopCable – Spanish cable manufacturer
15. AVK – Czech cable manufacturer

Organisations 1 to 4 provided comments on several aspects of the TSI, whereas organisations 5 to 15 commented only the specific point relative to the reaction to fire requirements for cables that was the object of the Technical Opinion ERA/OPI/2018-2 mentioned in points 3.3.3 and 4.3.1 and, as a consequence, of a new requirement in the revised SRT TSI. The arguments in favour of the change will not be repeated here: interested readers may refer to the Technical Opinion ERA/OPI/2018-2 referred to in point 3.3.3 and to the detailed answers that have been provided to contributors, available at the consultation webpage (https://www.era.europa.eu/library/consultations_en#consultation439).

Concerning comments provided by organisations 1 to 4, they resuted in a few changes to the TSI. Detailed answers are also available at the consultation webpage

5. Conclusions and next developments

5.1. Conclusions

This revision of the SRT TSI was the opportunity to introduce the CSM-RA for the fixed installations. This will certainly be helpful to applicants, while at the same time ensuring interoperability and contributing to the development of an optimal level of safety in the most cost-efficient way.

The revision also permitted to focus on the definition of a coherent set of measures ensuring the safety of passengers and on-board staff and the free movement of TSI-compliant vehicles. Measures that were not specific to this objective have been removed or simplified.

The SRT TSI being in force since 2008, there is a return of experience which permitted to simplify or clarify several requirements to the benefits of all stakeholders.

With this limited revision, the TSI on Safety in Railway Tunnel is completing its evolution as it covers all railway tunnels of the Union rail system with no limitation in length, covering clear risks for passengers and on-board staff for which detailed technical prescriptions are provided as well as the alternative possibility to cover the risks by the applcation of the CSM-RA.

Consequently, it is not expected that the TSI will require further revision in short term. The topics identified in the next paragraph as possible developments for the future will not be mature for an inclusion in a TSI before several years.

5.2. Next developments

To start with, in May 2018 the DG Joint Research Centre of the European Commission launched an expert group on the design of underground structures with the objectives to:

- Discuss the feasibility and assess the standardisation needs for design of underground structures
- Explore and assess the potential benefits from a possible new EN standard for design of underground structures

Whereas the structural design of a tunnel is not linked to interoperability, the Agency will keep updated with the activities of the expert group.

Secondly, as highlighted in paragraph 3.2.1, there are currently no harmonised parameters for evaluating the evacuation of pedestrians in tunnels. The Agency would like to reflect upon the need for establishing a workgroup on this topic. This workgroup could be multimodal on the model of the workshops on Risk Management in the context of rail, road and inland waterways Transport of Dangerous Goods successfully organised by the Agency since 2014.

6. Annex 1: Definitions and abbreviations

6.1. Abbreviations

Table 1 : Table of abbreviations

Abbreviation	*Description*
CSM-RA	Common Safety Methods on Risk Assessment (reference document item [2])
DD on TSIs	Delegated Decision on TSIs (reference document item [8])
DG	Directorate General
IM	Infrastructure Manager
RU	Railway Undertaking
SRT TSI 2014	TI on Safety in Railway Tunnels in force on 1st January 2015 (reference document item [1])
TSI	Technical Specification for Interoperability
WP	Working Party

7. Annex 2: Reference documents

Table 2 : Table of reference documents

N°	*Title*	*Reference*	*Version*
1	Commission Regulation (EU) No 1303/2014 of 18 November 2014 concerning the technical specification for interoperability relating to 'safety in railway tunnels' of the rail system of the European Union	OJ L 356, 12.12.2014, p. 394–420	*N.A.*
2	Commission Implementing Regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009	OJ L 121, 3.5.2013, p. 8–25	*N.A.*
3	Directive 2004/54/EC of the European Parliament and of the Council of 29 April 2004 on minimum safety requirements for tunnels in the Trans-European Road Network	OJ L 167, 30.4.2004, p. 39–91	*N.A.*
4	Commission Delegated Regulation (EU) 2016/364 of 1 July 2015 on the classification of the reaction to fire performance of construction products pursuant to Regulation (EU) No 305/2011 of the European Parliament and of the Council	OJ L 68, 15.3.2016, p. 4–11	

8. Annex 3: Reference legislation

Table 3 : Table of reference legislation

N°	Title	Reference	Version
5	Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system (Recast)	OJ L 138, 26.5.2016, p. 44.	N.A.
6	Regulation (EU) 2016/796 of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Railways and repealing Regulation (EC) No 881/2004	OJ L 138, 26.5.2016, p. 1.	N.A.
7	Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety (Recast)	OJ L 138, 26.5.2016, p.102.	N.A.
8	Commission Delegated Decision (EU) 2017/1474 of 8 June 2017 supplementing Directive (EU) 2016/797 of the European Parliament and of the Council with regard to specific objectives for the drafting, adoption and review of technical specifications for interoperability.	OJ L 210, 15.8.2017, p. 5–15	

9. Annex 4: summary of the main evolutions

The table below summarizes the main changes brought to the SRT TSI. It does not list the editorial changes nor the reference updates.

Clause of the TSI	*Characteristics*	*Evolution from the TSI 2014*	*Reason for the evolution*	*Comment*
1. Introduction				
1.1.4. Risk scope, risks that are not covered by this TSI	Risks for people in the neighbourhood of a tunnel where collapse of the structure could have catastrophic consequences	That type of risks is removed from the scope covered by the TSI	The TSI is covering the risks for passengers and on-board staff.	Such risks are covered by Eurocodes and national regulations. They are not in the scope of Interoperability
2. Definition of aspect/scope				
2.2.3 Prolonged stop	Prolonged stop may lead to panic and spontaneous uncontrolled evacuation	Removal of the term 'panic'	'Panic' is not clear and not factual	
2.4. Definitions	Definition of a "fire-fighting point"	The term "fire-fighting point" is replaced by "evacuation and rescue point"	Return of experience showed that "fire-fighting point" was creating a lot of confusion and did not correspond to the definition given.	
	Definition of "final place of safety"	The term 'final place of safety" used in the TSI is defined	As this concept is used in the TSI, it was necessary to define it. Discussions in the WP showed that	

Clause of the TSI	*Characteristics*	*Evolution from the TSI 2014*	*Reason for the evolution*	*Comment*
			there were different understandings	
3. Essential requirements				
3.1. Infrastructure and energy subsystems	Essential requirement 'Safety' applying to the Infrastructure and Energy subsystems.	The use of the CSM on risk assessment is introduced as an alternative to the corresponding parameters of sections 4.2.1 and 4.2.2.	Promote a risk-based approach to meet the Essential Requirement 'Safety'.	This evolution gives more flexiblity to the applicants
4. Characterisation of the subsystem				
4.2.1. Subsystem Infrastructure				
4.2.1.2. Fire resistance of tunnel structures	Resistance of the main tunnel structure during evacuation of the neighbourhing structures	The requirement has been removed.	Consistency with the risks in 1.1.4 and with the scope of the TSI (safety of passengers and on-board staff)	Simplification for the applicants
4.2.1.3. Fire reaction of building material	Reaction to fire of electric cables	Requirement updated according to the T.O ERA/OPI/2018-2 and moved to the Infrastructure section	Assessment is done by the NoBo for the subsystem Infrastructure and not Energy.	Removal of an excessively strict requirement and clarification of the role of NoBos
4.2.1.5.4 Emergency lighting on escape routes	(3) Position of lights:	Removal of the term 'as low as possible'	This unclear requirement is very difficult to assess	

Clause of the TSI	*Characteristics*	*Evolution from the TSI 2014*	*Reason for the evolution*	*Comment*
	• above the walkway, as low as possible,...			
4.2.1.6 Escape walkway	The height of the walkway shall be at top-of-rail level or higher	The height of the walkway shall be at bottom of rail level or higher	The top of rail level resulted from errors in translations and did not reflect the actual situation	Keeping the 'top of rail' requirement would have resulted in the creation of one or more specific cases
4.2.1.7 Fire fighting points (replaced by Evacuation and rescue points)	For consecutive tunnels to be considered as two tunnels, the separation in open air shall be longer than *'the maximum length of the train'*	Clarification that it's the maximum length of the *'passenger train'* that should be considered	Freight trains carrying no passenger, they should not be considered for rules on evacuation.	
NEW 4.2.1.9. Electricity supply for emergency response services 4.2.1.10. Reliability of electrical installations 4.2.1.11. Communication and lighting at switching locations	Requirements formerly numbered 4.2.2.3, 4.2.2.5 and 4.2.2.1 in the TSI 2014	Requirements are moved from the chapter on the 'Energy' subsystem to the chapter on the 'Infrastructure' subsystem	The assessment should rather be done by the NoBo for the subsystem Infrastructure and not Energy.	Clarification
4.2.2. Subsystem Energy				

Clause of the TSI	*Characteristics*	*Evolution from the TSI 2014*	*Reason for the evolution*	*Comment*
4.2.2.1. Sectioning of contact line	Requirement to to divide the energy supply system into sections of 5km	The requirement is replaced by a possibility given to the IM to have such sections	The requirement was too strict and, in many cases, not justified.	Simplification for the applicants
4.4. Operating rules				
4.4.2. Tunnel emergency plan	Involvement of Railway Undertakings in the development of adaptation of the Emergency Plan	It is clarified that RUs shall be informed, and may be involved in the development of the plan	The requirement to involve RUs in the development of the plan was too complex with many RUs to involve, not all known at the time of the development of the plan.	Simplification for the IMs
DELETED 4.8 Infrastructure and Rolling Stock registers		The paragraphs are removed	No need to duplicate – registers are supported by their own regulations	
6. Assessment of conformity and/or suitability for use of the constituents and verification of the subsystem				
6.2. Subsystems				
DELETED 6.2.6 Assessment of operational rules	This point is deleted		No need to duplicate requirements that are specified in other texts	

Clause of the TSI	*Characteristics*	*Evolution from the TSI 2014*	*Reason for the evolution*	*Comment*
NEW 6.2.6. Assessment of conformity for the Safety requirements applying to the Infrastructure and Energy subsystems	This paragraph details the roles of the actors for the assessment of the essential requirement 'Safety' when applying the CSM-RA	New requirement in line with the introduction of the CSM-RA in clause 3.1		
DELETED 6.2.7.1 Prevent unauthorised access to emergency exits and equipment rooms			These points do not bring valuable information for the Notified Bodies to perform the assessment	
DELETED 6.2.7.5 Access and equipment for emergency response services			The notified Bodies do not perform such assessment	
NEW 6.2.7.5. Emergency lighting in upgraded/renewed tunnels	In case of upgraded/renewed tunnels, the assessment consists in the verification of the existence of the lighting	Existing tunnels generally do not have the characteristics enabling the assessment of the lighting system (e.g. no walkway)		
7. Implementation				

Clause of the TSI	*Characteristics*	*Evolution from the TSI 2014*	*Reason for the evolution*	*Comment*
7.2. Application of this TSI to subsystems already in service				
7.2.2 Upgrade or renewal of a tunnel	The minimum requirements to apply for an upgrade or renewal project are listed	Replacement of a general statement with detailed specification	Applicants need consistency and some certainty on what needs to be done	Simplification for the applicants
NEW 7.2.2.2. Extension of a tunnel	The minimum requirements to apply for the extension of an existing tunnel are listed	The case of a tunnel extension is more complex as it combines an upgrade/renewal with a new part of tunnel.	Return of experience show that such extension projects raise many questions.	
Appendix				
Appendix B: Assessment of the Subsystems	The role of the NoBo in the assessment on site is enlarged.		The principles of a 3rd party inspection require the verification of conformity to an approved design.	Additional site inspection generating additional cost

EUROPEAN UNION AGENCY FOR RAILWAYS

Making the railway system work better for society.

Light Impact Assessment

Revision of the technical specification for interoperability relating to 'safety in railway tunnels' (SRT TSI)

	Elaborated by	*Validated by*	*Approved by*
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Date	08/11/2018	08/11/2018	08/11/2018
Signature	(signed)	(signed)	(signed)

Document History

Version	*Date*	*Comments*
1.0	08/11/2018	Final version

Contents

1. Context and problem definition

1.1. Problem and problem drivers	Article 4.3(h) of the Interoperability Directive (2016/797) requires the indication of the provisions applicable to the existing subsystems and vehicles, in particular in the event of upgrading and renewal and, in such cases, the modification work which requires an application for a new authorization. The SRT TSI currently in force does not contain the above mentioned elements and therefore needs to be revised in order to ensure compliance to the 4th RP requirements with particular reference to fixed installations. The existing vehicle related TSIs (LOC&PAS, WAG) face the same problem and changes for these TSIs were necessary to resolve the problem. Furthermore, Article 3 of the Commission Delegated Decision (EU) 2017/1474 specifies common specific objectives for revising TSIs. In the case of the SRT TSI revision the following aspects were considered relevant: *3. TSIs shall be reviewed where appropriate to ensure the right balance between rule-based and risk-based approaches.* *5. The TSIs shall, where appropriate, include provisions which:* *(b) take into account the developments of the Union railway system and related research and innovation activities, and integrate them when they reach the appropriate level of maturity;* *(i) take into account the sector's best practice and review the choice of modules prescribed in the procedures for conformity assessment of interoperability constituents and subsystems;* These elements draw also on issues identified as 'Whereas' in the Commission Delegated Decision. Moreover, the following element is also of relevance: *(6) TSIs revisions should take into account the experience of the railway sector regarding unclear requirements or other unintended impacts and costs resulting from the TSIs, including in particular the experience of Rail Freight Corridors or experiences resulting from the application of the TSIs to low density lines.*
1.2. Main assumptions	SRT TSI in general: All introduced changes, which are not directly in the context of the 4th RP, are implementing clarifications / simplifications of the requirements or providing enhanced flexibility for the concerned stakeholders. The only exception to this concerns a provision for an enlarged role of the NoBo in the assessment on-site which would generate additional

<table>
<tr><td></td><td>cost. However, it is expected that this cost increase is limited and more than outweighed by the other changes to the SRT TSI.</td></tr>
<tr><td>1.3. Stakeholders affected</td><td>
<table>
<tr><th>Category of stakeholder</th><th>Importance of the problem</th></tr>
<tr><td>IMs</td><td>5
As a contracting entity ordering the design, construction, renewal or upgrading of a subsystem any unclear or complex requirements in the SRT TSI requirements may add costs to such projects including higher costs for the conformity assessment / authorization. The current limited flexibility provided for applicants regarding fulfilling essential requirements is of importance. These aspects may be particular pertinent for infrastructure managers given their significant responsibility for fixed installations in the context of the SRT TSI.</td></tr>
<tr><td>Suppliers</td><td>4
Suppliers are affected by the problem in their role as delivering subsystems (design, construction, renewal or upgrading) for the contracting entity. Unclear or complex requirements would result in higher resources required. Furthermore, suppliers taking the role as applicant for placing in service of subsystems would be affected by non-optimal provisions linked to the conformity assessment and authorisation of subsystems.</td></tr>
<tr><td>NoBos</td><td>3
NoBos are affected by the problem in their role of undertaking the conformity assessment against the requirements of the relevant TSI using the assessment modules. In particular, any unclarity regarding the provisions in the SRT TSI will create challenges for the NoBos regarding how to determine whether given projects conform to the TSI requirements.</td></tr>
<tr><td>NSAs</td><td>2
NSAs are slightly impacted by the problem as they are involved in the</td></tr>
</table>
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</table>

<table>
<tr><td></td><td>
<table>
<tr><td></td><td>authorization of fixed installations as well as the authorization of vehicles.</td></tr>
<tr><td>Agency</td><td>1
Not directly impacted by the problem. ERA is not involved in the authorization for the placing in service of fixed installations, however it is involved in the authorization of vehicles</td></tr>
</table>
*) 1=low; 5=high
</td></tr>
<tr><td>1.4. Evidence and magnitude of the problem</td><td>Evidence of the problems experienced with the current SRT TSI was confirmed by the railway sector via the speakers of their representative organisations (EIM, CER, UNIFE, ERFA, UITP, FEDECRAIL and NB Rail) along with NSAs in the ERA SRT TSI working party meetings. In particular, the Accompanying Report mentions in Section 2.3.4 (Return of experience of the TSI users) 'Stakeholders were invited to provide comments and requests for changes on the basis of their return of experience with the TSI'. Furthermore, two Agency Technical Opinions linked to the SRT TSI provided evidence on the specific issues concerned:
› Technical Opinion ERA/OPI/2014-6 (re. assessment of electric cables)
› Technical Opinion ERA/OPI/2018-2 (re. potentially excessive reaction to fire requirements for exposed cables in tunnels)</td></tr>
<tr><td>1.5. Baseline scenario</td><td>The baseline scenario would be the case when the current SRT TSI is not revised. As such this could create inconsistencies with the 4th RP as well as preventing possible gains from simplification, clarification of the TSI provisions and higher level of flexibility for the concerned stakeholders.</td></tr>
<tr><td>1.6. Subsidiarity and proportionality</td><td>The activities related to the SRT TSI revision are mandated to the Agency in the Delegated Act 2017/1474 of the European Commission. As such, it concerns existing legislation where the underpinning principle is to focus harmonisation effort on promotion of interoperability without introducing any additional requirements.</td></tr>
</table>

2. Objectives

2.1. Strategic and specific objectives	**The strategic objective(s) of the Agency** with which this initiative is coherent include: ☐ Europe becoming the world leader in railway safety ☐ Promoting rail transport to enhance its market share ☒ Improving the efficiency and coherence of the railway legal framework ☐ Optimising the Agency's capabilities ☐ Transparency, monitoring and evaluation ☒ Improve economic efficiency and societal benefits in railways ☐ Fostering the Agency's reputation in the world The **specific objective** is to align the SRT TSI with the 4th Railway Package thereby contributing to the objectives of the 4th RP (as quoted in the 4th RP IA). Other specific objective(s) for the revision include (see Section 1.1 of this impact assessment report): › *to ensure the right balance between rule-based and risk-based approaches regarding the application of the TSIs;* › *to take into account (when relevant) the developments of the Union railway system and related research and innovation activities, and integrate them when they reach the appropriate level of maturity;* › *to take into account the sector's best practice and review the choice of modules prescribed in the procedures for conformity assessment of interoperability constituents and subsystems*
2.2. Link with Railway Indicators	Specific (monitoring) indicators can be developed with particular reference to the resources (incl. costs and time) of using the SRT TSI by the concerned stakeholders. Further details on this aspect are provided in Section 6.1.

3. Options

3.1.	**List of options**	**Option 0** (Baseline) **Option 1** — Revision of the SRT TSI
3.2.	**Description of options**	Option 0 (Baseline) › *No revision of the SRT TSI* Option 1 – Revision of the SRT TSI › *The proposed revision is set out in the SRT TSI Recommendation together with the accompanying report* › *Main changes concern:* › *Possibility given to applicants to apply the CSM-RA for the INF and ENE subsystems, instead of the SRT TSI basic parameters of sections 4.2.1 and 4.2.2* › *Various adjustments of the current SRT TSI in order to simplify or clarify the text to facilitate its use by the concerned stakeholders (see accompanying report, Annex 4)* › *The role of the NoBo is enlarged in terms of onsite assessment (linked to Appendix B – Assessment of Subsystems)*
3.3.	**Uncertainties/risks**	Given that the revision of the SRT TSI is relative limited in scope it is considered that there are only minor uncertainties and risks involved regarding the impact assessment including the main conclusions concerning the preferred option (see Section 5).

4. Impacts of the options

4.1. Impacts of the options (qualitative analysis)

The baseline was not included in the analysis as the impacts of the options are compared against the baseline.

Category of stakeholder		*Option 1*
IMs	Positive impacts	Given the focus of the SRT TSI revision on fixed installations infrastructure managers are expected to be a key stakeholder affected by the changes put forward. It is expected that IMs would be positively impacted due to clarification and simplification of requirements in the TSI along with increased flexibility by allowing the use of the CSM-RA to fulfill the essential requirement 'safety'. It should be noted that IMs are expected to be positively impacted by the adjustment of provision for fire requirements for exposed electric cables (see Agency Technical Opinion ERA/OPI/2018-2).
	Negative impacts	For IMs very limited negative impacts are expected given that only one change may involve a small cost increase (for enlarged on-site inspections by NoBos). It is expected that this cost increase would be outweighed by reduced costs from the remaining changes to the TSI text.
Suppliers	Positive impacts	Suppliers are expected to be positively impacted from the revised SRT TSI in their role as contractor and applicant for verification / authorization of subsystems. The positive impacts are generated from the simplification / clarification and increased flexibility for the users of the TSI creating the possibility for cost savings.
	Negative impacts	Similar to the explanation given for IMs suppliers are only expected to be negatively impacted from a single change (enlarged on-site inspections for NoBos). As noted earlier any additional costs from this change are expected to be minor and outweighed by the other

			changes included in the SRT TSI revision proposal.
	NoBos	Positive impacts	NoBos would benefit from increased clarity of the SRT TSI text with particular focus on the aspects linked to the provisions for conformity assessment.
		Negative impacts	N/A
	NSAs	Positive impacts	Impacts on NSAs are expected to be relative modest, although the simplification and / or clarification of the SRT TSI requirements may have a limited positive impact on resources for authorisation for the placing in service of fixed installations.
		Negative impacts	No negative impacts on NSAs are foreseen
	Agency	Positive impacts	N/A
		Negative impacts	N/A
	Overall assessment *(input for section 5.1)*	Positive impacts	Overall, almost all changes introduced in the SRT TSI revision involve clarification / simplification of requirements or increased flexibility for the stakeholders (e.g. possibility for using the CSM-RA). This should lead to benefits for the concerned stakeholders (users) in terms of reduced challenges and resources for applying the TSI incl. reduced uncertainty regarding the interpretation of the provisions in the SRT TSI. As such, the revision is ensuring interoperability and contributing to the development of an optimal level of safety in the most cost-efficient way within the scope of the SRT TSI.
		Negative impacts	A single change has been identified as adding costs for the users of the SRT TSI (additional BPs to be checked by NoBos on site). However, it is foreseen that any negative cost impact is very limited and compensated by: a) certainty that subsystems are indeed TSI compliant; b) aggregated cost savings from the other changes introduced in the TSI revision. In particular, it is foreseen that in the case of new tunnels (and extended tunnels) costs would be negligible as these additional visits would be

			integrated into the overall work of the NoBo. In the case of upgraded and renewed projects there could be limited cost increase, but this cost increase would be very small (e.g. representing one additional day of NoBo time as an upper limit)

4.2. Impacts of the options (quantitative analysis)

Given the limited revision scope a quantitative assessment of benefits and costs has not been undertaken. However, on the basis of the available evidence regarding the changes put forward it is very likely that the aggregated benefits will outweigh the aggregated costs. In particular, it is foreseen that the net-benefits will be positive such that a positive NPV would be achieved (or a B/C ratio above 1).

The baseline was not included in the analysis as the impacts of the option(s) are compared against the baseline.

Category of stakeholder		*Option 1*
IMs	Benefits (euro)	N/A
	Costs (euro)	N/A
Suppliers	Benefits (euro)	N/A
	Costs (euro)	N/A
NoBos	Benefits (euro)	N/A
	Costs (euro)	N/A
NSAs	Benefits (euro)	N/A
	Costs (euro)	N/A
Agency	Benefits (euro)	N/A
	Costs (euro)	N/A
Overall	Benefits (euro)	N/A
	Costs (euro)	N/A

	Option 1
***NPV** (input for section 5.2)*	*N/A*
***B/C ratio** (input for section 5.2)*	*N/A*

5. Comparison of options and preferred option

5.1.	**Effectiveness criterion (options' response to specific objectives)**	The proposed Do-Something option (Option 1) meets the specific objectives for the SRT TSI revision
5.2.	**Efficiency (NPV and B/C ratio) criterion**	Given the limited revision scope a quantitative assessment of benefits and costs has not been undertaken (See Section 4.2). However, on the basis of the available evidence regarding the changes put forward it is very likely that the aggregated benefits will outweigh the aggregated costs. In particular, it is foreseen that the net-benefits will be positive.
5.3.	**Summary of the comparison**	Option 1 (Do-Something) compares favourably to Option 0 (baseline) both in terms of effectiveness and efficiency.
5.4.	**Preferred option(s)**	Option 1 (Do-Something) consisting of the proposed recommendation for revision of the SRT TSI is preferred compared to the baseline (Option 0).
5.5.	**Further work required**	No further work is expected in relation to this revision of the SRT TSI

6. Monitoring and evaluation

6.1.	**Monitoring indicators**	In line with the identified aspects for monitoring and evaluation arrangements in the SRT TSI impact assessment from the previous TSI revision (2014) relevant indicators should distinguish between: › *The efforts to use the revised SRT TSI and the observed obstacles.* › *The actual results brought by the revision. Of particular interest would be conformity assessment costs, time and resources involved for authorisations of subsystems (fixed installations and vehicles)*
6.2.	**Future evaluations**	The next SRT TSI revision is not expected in the short term but rather the mid / long term. In accordance with the provision in the Agency Regulation (Art. 8.3) the Agency may conduct an *ex post* assessment of the legislation based on its recommendations (e.g. the SRT TSI).