SLOVENSKI STANDARD
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Železniške naprave - Vzdrževanje vozil - Vodilo za prepoznavanje in ravnanje z varnostno kritičnimi sestavnimi deli železniških vozil

Railway applications - Vehicle Maintenance - Guide for identification and management of Safety Critical Components for railway vehicles

Bahnanwendungen - Fahrzeuginstandhaltung - Leitfaden zur Identifizierung und dem Management von Sicherheitskritischen Komponenten für Schienenfahrzeuge

Applications Ferroviaires - Maintenance des véhicules - Guide pour l'identification et le management des Composants Critiques de Sécurité pour les véhicules ferroviaires

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Foreword

This document (FprCEN/TR 17696:2021) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document is currently submitted to the Vote on TR.

Introduction

The following document is focused on the new concept of Safety Critical Component (SCC) introduced in the recent framework of the European legislation.

1 Scope

The objective of this document is to provide an overview of the SCCs requirements captured from the current legislation and the actors involved in their fulfilment.

In addition, this document aims to promote a common understanding of those requirements together with practical arrangements to fulfil them in a proper way and giving guidance for the SCCs identification and management.

The objective of the document is neither to produce an applicable list of SCCs nor to provide for examples of SCCs.

This document is applicable to vehicles only. The definition of "vehicle" is as in Art. 3(21) of the Safety Directive [3].

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
renewal
any major substitution work on a subsystem or part subsystem which does not change the overall performance of the subsystem

3.2
upgrade
upgrading
any major modification work on a subsystem or part subsystem which improves the overall performance of the subsystem

3.3
refurbishment
programme of interior/exterior work, other than routine maintenance or repair, undertaken on a railway vehicle to restore or enhance the level of design and performance

3.4
engineering change
change to a railway vehicle, including control software, in the area of design, construction or maintenance which affects, or potentially affects, conformity to applicable requirements

4 Symbols and abbreviations

For the purposes of this document, the following abbreviations apply with reference to Article 15 of Regulation (EU) 2018/545 (Practical arrangements for vehicle authorisation).

Table 1 — Abbreviations

Symbol	Designation
SCC/SCCs	Safety Critical Component/s
REX	Return on Experience
TSI	Technical Specification for Interoperability
REF	Reference
CSI	Common Safety Indicator
CSM	Common Safety Method
ECM	Entity in Charge of Maintenance
RU	Railway Undertaking

5 SCCs definition

5.1 General

The definition of SCCs is the combination of REF13 or REF14 (see Annex A for REFs captured) and the definition of "serious accident" as in Article 3(12) of the Safety Directive [3].

The definition of "safety critical components" in REF13 and REF14 is the same. Here below REF14 is shown in detail:

REF14

*The Annex to Regulation (EU) No 1302/2014 (**TSI Loc & Pas**) is amended as follows:*

……

***(39)** point (4) of section 4.2.12.1 is replaced by the following:*

'(4) The documentation also includes a list of safety critical components. Safety critical components are components for which a single failure has a credible potential to lead directly to a serious accident as defined in Article 3*(12) of Directive (EU) 2016/798.*

The "***serious accident***" captured from Article 3(12) of the Safety Directive [3] is defined as:

Article 3 Definitions

***(12) 'serious accident'** means any train collision or derailment of trains resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other accident with the same consequences which has an obvious impact on railway safety regulation or the management of safety; 'extensive damage' means damage that can be immediately assessed by the investigating body to cost at least EUR 2 million in total;*

Based on the above-mentioned references, the following is the complete definition of **Safety Critical Components**:

Safety critical components *are components for which a single failure has a credible potential to lead directly to:*

— any train collision or derailment of trains resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment; and

— any other accident with the same consequences which has an obvious impact on railway safety regulation or the management of safety;

'extensive damage' *means damage that can be immediately assessed by the investigating body to cost at least EUR 2 million in total.*

5.2 Identification of accidents and consequences related to SCCs definition

As shown in 5.1, the SCCs definition is fundamentally based on the occurrence of a "serious accident".

The "serious accident" definition identifies typical railway accidents and their specific consequences, which aids the comprehension of the SCCs definition.

Based on the definitions reported in Annex B, a list of typical railway accidents and a list of consequences related to the definition of SCCs can be compiled. These lists can be used for subsequent analyses in order to identify the safety critical components.

The following is a non-exhaustive **list of accidents**, related to the definition of SCCs, caused by the single failure of a vehicle's component:

Table 2 — SCCs - List of accidents

derailment		
collision	*collision of train with obstacle*	*collision of train with rail vehicle*
level crossing accident		
accident to persons involving rolling stock in motion	*persons falling from trains* *persons hit by a railway vehicle or by an object attached to, or that has become detached from, the vehicle*	*passengers in station hurt by train*
fire/explosion	*fires in an area inside or outside the railway premises*	
dangerous goods release during transport	*pollution of an area by liquid, solid or gas release of goods*	
objects detached from trains		
electrocution		
other accidents causing damage	*material damage to an area (e.g. trees pulled down by rolling stock in motion, infrastructure damage, railway premises, …)*	*damage to rolling stocks*

A more complete list of accidents to be considered can be obtained through experience, historical data and statistics.

The **consequences** to be considered as the effect of the accident are the following (single effect or combination of effects):

Table 3 — SCCs – List of consequences

death of at least one person
serious injuries to five or more persons
damage to rolling stock, the infrastructure or the environment assessed to cost at least 2 million EUR in total

6 SCCs requirements: actors and vehicles involved

6.1 General

The recent framework of the European legislation contains many new inputs related specifically to SCCs. These inputs state the SCCs requirements to be accomplished and the actors involved in their accomplishment.

Annex A contains the list of SCCs references and requirements captured from the legislation.

6.2 SCCs requirements and actors involved

The following table collects the outcome of the capture process in Annex A splitting the SCCs requirements among the different actors involved.

Table 4 — SCCs Requirements capture

Doc. Ref. N°	Short Title	REF N.	Actors involved
[1]	Agency regulation	REF1	Agency
[2]	Interoperability Directive	REF2	Commission
		REF3	All
[3]	Safety Directive	REF4	Commission
		REF5	ECM, ECM functions
[4]	ECM Regulation	REF6	Manufacturer, ECM
		REF7	ECM, ECM functions
		REF8	All the actors involved
		REF9	Manufacturers, ECM, Keeper, ECM functions
		REF10	ECM, ECM maintenance development function
		REF11	ECM, ECM maintenance delivery function
[5]	TSIs Loc&Pas and WAG revision	REF12	Manufacturer, Agency
		REF13	Manufacturer, RU/Keeper, ECM
		REF14	Manufacturer, RU, ECM

6.3 SCCs requirements and their applicability to railway vehicles

To make clear the applicability of SCCs requirements in the field of railway vehicles, it is necessary to distinguish between two categories of vehicles:

— **new vehicle;**

— **existing vehicle.**

This distinction is made as not all the SCCs requirements are applicable to both the categories of vehicles.

The tables in next section are split among these two categories of vehicles.

For convenience, a **new vehicle** is a vehicle for which an applicant has requested from the authorising entity the vehicle type authorisation for placing on the market/authorisation for placing in service under the new legislation (complying with Regulation 2018/545 and using the One-Stop-Shop of Agency).

An **existing vehicle** is a vehicle that does not meet the criteria of a new vehicle.

The SCCs requirements for new vehicles also apply to existing vehicles that have a vehicle type authorisation for placing on the market/authorisation for placing in service following engineering change/renewal/upgrading/refurbishment, only for the parts of the vehicle related to engineering change/renewal/upgrading/refurbishment.

In that case, the **entity managing the change** (holder of the vehicle type authorisation or other) plays the same role as the Manufacturer (see 6.4 and 7.1 for details).

In addition, the applicant for the vehicle type authorisation is responsible for compiling the **technical file** that is to accompany the 'EC' declaration of verification when the application is submitted (see Art. 15 of the Interoperability Directive [2]).

When the vehicle type authorisation is issued, the applicant becomes the holder of the vehicle type authorisation and keeps a copy of the technical file throughout the service life of the vehicle (see Annex IV 2.6 of the Interoperability Directive [2]).

In the case of a change to the vehicle, the technical file is kept up to date by the entity managing the change to the vehicle, that is the holder of the vehicle type authorisation or other entity managing the change (see Regulation (EU) 2018/545, Articles 15 and 16).

Usually, the detailed content of the different documents of the technical file is prepared by the Manufacturer of the vehicle, where the Manufacturer itself may play the role of "applicant".

The **maintenance documentation** is a part of the technical file and it is given by the applicant (directly or via the Keeper) to the ECM to make it able to manage and implement the maintenance of the vehicle.

The ECM is responsible for arranging the first "**maintenance file**" by adapting the maintenance documentation to the real operating conditions, performances required and return on experience and to keep updated the maintenance file throughout the lifecycle of the vehicle.

In addition, in the case of existing vehicle, the ECM is responsible for managing the maintenance documentation (see Art. 14 3(b) of the Safety Directive [3]) and keeping it updated throughout the lifecycle of the vehicle.

The technical file and the maintenance file play a fundamental role in the accomplishment of the SCCs requirements.

6.4 Tables of SCCs requirements with actors and vehicles involved

This clause sets out in three tables the SCCs requirements among actors and vehicles involved in the main phases of the life. Each table represents the responsibilities of each actor or group of actors in respect of new or existing vehicles.

The tables do not consider the SCCs requirements related to the Agency or the Commission or any sentence from the "whereas" section of the references captured as requirements to be accomplished (see Annex A).

When developing its activities and preparing documentation, the **Manufacturer/Entity managing the change** is responsible for:

Table 5 — SCCs requirements for Manufacturer/Entity managing the change

Legislation	References	Phase	Requirement	New vehicles	Existing vehicles
Interop. Directive	REF3	Design	carrying out design, construction or assembly of SCCs, and more particularly of the components involved in train movements, in such a way to guarantee the corresponding safety level of the network in normal and degraded situations	X	X[1]
TSIs	REF13 and REF 14	Design	inserting a SCCs list into the technical file	X	X[1]
TSIs	REF13 and REF 14	Design	inserting a SCCs list into the maintenance description file together with specific servicing, maintenance and servicing/maintenance traceability requirements	X	X[1]
TSIs	REF13 and REF 14	Design	inserting a SCCs list into the operation documentation together with specific operational and operational traceability requirements	X	X[1]
TSIs	REF13 and REF 14	Design	specifying precedents, principles and methods used to identify SCCs and their specific operational, servicing, maintenance and traceability requirements inside the Maintenance Design Justification File	X	X[1]
TSIs	REF13 and REF14	Design	developing specific operational and operational traceability requirements during the design phase	X	X[1]
TSIs	REF13 and REF 14	Design	identifying specific servicing, maintenance and maintenance traceability requirements during the design phase	X	X[1]

Legislation	**References**	**Phase**	**Requirement**	New vehicles	Existing vehicles
TSIs	REF13 and REF 14	Operation	collaborating with the RU/Keeper to develop specific operational and operational traceability requirements after the vehicles have entered into operation	X	X
TSIs	REF13 and REF 14	Operation	collaborating with the ECM to identify SCCs and their specific servicing, maintenance and maintenance traceability requirements after the vehicles have entered into operation	X	X
ECM Regulation	REF8	Design/Operation	considering the SCCs definition during design and in the service life of the vehicle to identify new SCC or manage its changes	X	X[1]
ECM Regulation	REF9	Design/Operation	managing information and maintenance instructions of SCCs in the technical file	X	X[1]
ECM Regulation	REF9	Operation	confirming if new SCC identified by the ECM is safety-critical through a risk assessment taking into account the use and environment of the component	X	X
ECM Regulation	REF9	Operation	providing technical and engineering support about SCCs and their safe integration, when the ECM or Keeper address a request	X	X

NOTE 1 Only in the case of design for engineering change/renewal/upgrading/refurbishment of existing vehicles, for the Entity managing the change (Manufacturer or other entity), limited to only the parts of the vehicle related to engineering change/renewal/upgrading/refurbishment.