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NB-Rail Association

RECOMMENDATION FOR USE

NB-RAIL COORDINATION GROUP

Administrative Decision according to Interoperability Directive
(EU) 2016/797 art. 30.6



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RFU-RST-313

Issue 01
Date 17/06/2021

TITLE

USE OF EN 45545-2 §4.7 FOR PRODUCTS THAT DO NOT REQUIRE TO BE COMPLIANT

ORIGINATOR

EISENBAHN-CERT (EBC)

SUBJECT RELATED TO

TSI Loc&Pas (1302/2014 (EU))
Reg. (EU) 2018/868
Reg. (EU) 2019/776
Reg. (EU) 2020/387

AMENDMENT RECORD:

17-06-2021 First issue

DESCRIPTION AND BACKGROUND EXPLANATION

Background:

The material requirements according to TSI Loc & Pas (1302/2014 (EU)) are defined in clause 4.2.10.2.1 (2) as follows:

“Materials used to construct the rolling stock unit shall comply with the requirements of the specification referenced in Appendix J-1, index 58 (EN 45545 [N02]) for the ‘Operation Category’ as defined below.”

Description of the situation:

In order to meet the safety objectives "personal protection" according to EN 45545-1 [N01], EN 45545 defines different measures. One of these measures defines requirements for materials in part 2 of EN 45545 [N02].

It is very difficult to define general, normative requirements that include all possible and individual applications. This also applies to future designs. When preparing the EN, the author of the standard was aware that components have to meet many different requirements, so that material requirements of EN 45545-2 [N02] cannot always be met, if additional requirements on the material (e.g. safety-relevant functional requirements) are contradicting. Therefore, clause 4.7 of EN 45545-2 [N02] provides a possibility for materials that do not meet the requirements of clause 4.2 to 4.5 of EN 45545-2 [N02] to be approved due to their functional necessity. However, the unconsidered use of materials should be avoided. Therefore, appropriate conditions for the use of the material and the verification were defined. This is intended to enable legally compliant use and to limit the scope for interpretation.

The exact definition and the resulting requirements for compliance with clause 4.7 of EN 45545-2 can be seen below:

“4.7 Products to be approved on functional necessity

If it can be shown that any of the requirements specified above are not technically achievable with functionally suitable products, then existing commercially available



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products can be used until and unless a suitable product is developed. There shall be no requirement to consider products made available after the date of the contract.

The use of this paragraph has the following conditions:

- *essential requirements in 4.1 shall not be compromised;*
- *this shall be verified by assessment; taking the proposed design into consideration; including the functional reason and limitation for using the material in question (e. g. climate and/or infrastructure).*

NOTE It can be necessary to use this process in respect of products such as: rubber tyres; rubber suspension components; intercommunication gangways, electronics devices on printed board, flexible metal/rubber units; window seals; seals for doors; brake hoses; pneumatic hoses; flexible fuel hoses; high voltage cables; data bus cables, the anti-spall layer for windscreens on the driver's cab, windscreen washer water containers."

Standards

Ref. No.	Name	Title	Issue
[N01]	EN 45545-1:2013	Railway applications -Fire protection on railway vehicles -Part 1: General	2013-03-01
[N02]	EN 45545-2:2013	Railway applications -Fire protection on railway vehicles -Part 2: Requirements for fire behaviour of materials and components	2015-10-01

RFU PROPOSAL

This RFU provides information on the performance of a step-by-step analysis for the application of clause 4.7 of EN 45545-2 [N02]. The use of this clause is applied to components that shall be used in rail vehicle construction due to their functional necessity.

The RFU is compatible with the risk management approach defined in the CSM-RA Regulation¹.

The step-by-step analysis for the application of clause 4.7 of EN 45545-2 [N02] shall be performed according to the following evaluation method in figure 1.

¹ Implementing Regulation (EU) 2015/1136 of the Commission of 13 July 2015 amending Implementing Regulation (EU) No. 402/2013 on the common safety method for the evaluation and assessment of risks with the correction of Implementing Regulation (EU) 2015/1136



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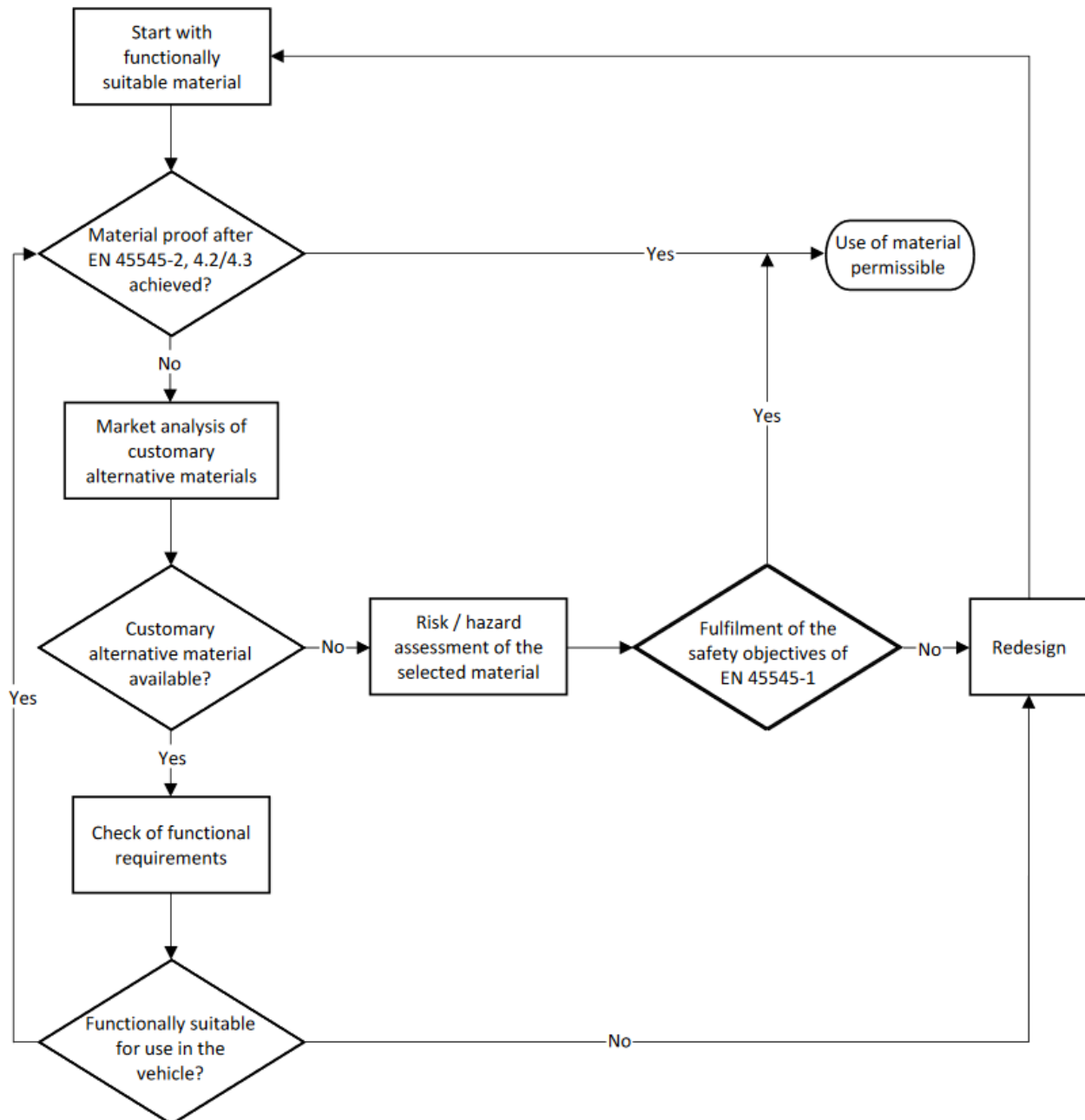


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Figure 1: Evaluation Flowchart



The annex to this RFU contains a definition of terms and further information on the procedure.

If the use of material is permissible according to this procedure, the material is compliant to the material requirements in TSI Loc & Pas (1302/2014 (EU)), clause 4.2.10.2.1 (2).



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THIS RFU WAS AGREED ON

PLENARY MEETING 62

THIS RFU ENTERS INTO FORCE ON

21/06/2021

FROM THIS DATE ON THIS RFU CAN BE APPLIED INSTEAD OF THE PREVIOUS MANDATORY VERSION.

RFU APPLICATION IS MANDATORY STARTING FROM

21/09/2021

AT THIS DATE ANY PREVIOUS VERSIONS (OR, ALTERNATIVELY, VERSION XX) OF THIS RFU WILL BE WITHDRAWN.

RFUS SHALL BE APPLIED BY ALL NOBOS. PLEASE REFER TO RFU-STR-702, CHAPTER 3 OF THE SECTION "DESCRIPTION AND BACKGROUND EXPLANATION", FOR THE LEGAL BASIS SUPPORTING THIS OBLIGATION.

ERA COMMENTS

PM 62 – 17/06/2021: NO COMMENTS - OR SPECIFY IF ANY
ERA DISCLAIMER WILL BE INCLUDED

ANNEX

Definition of terms

- *Functionally suitable and necessary*: A functionally suitable component is defined according to EN 45545-1 [N01],3.25 as follows: "functionally suitable product is one which will meet the required static, dynamic and mechanical properties for use in the specified operating environment, (e.g. temperature, chemicals, humidity) and have a life consistent with normal industry maintenance schedules"
- *Customary*: Customary components are:
 - available on the rail vehicle market and have been tried and tested for the specific application as well as suitable and used in accordance with the up to now national regulations²;
 - from suppliers with agencies, distributors or sales opportunities within the scope of the European Economic Area.
- *Date of contract*: Date of the contract between the contractor (for vehicle manufacture/maintenance/rebuilding) and the customer (e.g. operator, leasing company).

² See e.g. TSI LOC&PAS (1302/2014/EU) clause 7.1.1.5



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- *Vehicle owner*: the natural or legal person who, as the owner or legal entity of the vehicle, uses a vehicle as a means of transport³. The vehicle owner is responsible for the safe state of the vehicle.
- *Railway companies (RCs)*: public institutions or private legal entities providing railway transport services⁴. The RCs carry the responsibility for the safe operation of vehicles.
- *Vehicle manufacturers*: The vehicle manufacturer is responsible for the overall production of the vehicle. In the event of modifications or rebuilding work, the responsible company can become the vehicle manufacturer.
- *Component manufacturers*: Designer and manufacturer of a component consisting of materials which they do not produce themselves. The vehicle manufacturer is also a component manufacturer for in-house designs or directly purchased materials.
- *Material manufacturers*: Manufacturer of individual materials/raw materials.

Procedure

Component description

In the first step, the component⁵ is explained, which should be used based on its functional necessity.

The following criteria are necessary with regard to the component description:

- Functional description of the component.
- Description of the installation area of the component.
- Description of the intended accessibility of the installation area for staff, passengers and third parties.

In addition, the following criteria should be taken into account:

- Identification of maintenance/servicing intervals with regard to the lifetime of the vehicle.
- Further component properties, if applicable.

Description of the requirements in the specific application case

Set of requirements

The sets of requirements to be applied according to EN 45545-2 [N02] chapters 4.2 and 4.3 shall be determined. These support the assessment within the scope of the risk analysis.

Safety objectives

³ see 2008/110/EG (Railway Safety Directive)

⁴ see General Railway Act (AEG)

⁵ The term "component" used in this guide covers products, assemblies, components....



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In clause 4.1 of EN 45545-2 [N02], safety objectives are specified as follows:

“The design of rolling stock and the products used shall incorporate the aim of limiting fire development should an ignition event occur so that an acceptable level of safety is achieved. If the objectives defined in Clause 4 of EN 45545-1:2013 are met, then there should be a high probability that in the event of a fire, passengers and staff will be able to escape from the fire unaided and be able to reach a place of safety.”

Note: According to the scope of application of EN 45545-1 it has to be considered that it does not fall within the scope of EN 45545 to describe measures which ensure the preservation of vehicles in case of fire and which go beyond what is necessary for the protection of passengers and personnel.”

The rail vehicles are assigned to the respective operating and design categories in accordance with Clause 5.2 and Clause 5.3 of EN 45545-1 [N01].

Market analysis

Another important measure is to carry out a market analysis for an alternative of the component to be used. The alternative component shall meet the requirements defined as functionally necessary.

Market availability requires proof of suitability⁶.

The result of the market availability shall be documented.

Consideration of component and supplier qualification is necessary⁷.

Basic procedure for market analysis:

- Preparation of an inquiry drawing and a component specification with reference to compliance with EN 45545-2 [N02].
- Inquiry to suppliers with representations or distributors or distribution possibilities in the European Economic Area, from which the fulfilment or partial fulfilment of the component specification can be assumed. The following proofs for the functional requirements have to be requested:
 - Test results of fire protection tests of the material
 - Results of the tests of the defined functional requirements.

Ignition model

The five ignition models to be considered are defined in EN 45545-1 [N01], Annex A and assigned to the following three different fire origin categories. With regard to the performance of the risk and hazard analysis for the considered component, the relevant fire resulting risks with the associated fire ignition models has to be taken into account.

Accidental ignition or arson

⁶ This can include, for example, test certificates in the field and on the test bench.

⁷ This does not exclude the use of new suppliers.



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This type of fire typically includes ignition of the component by newspapers, cigarettes and gas lighters. Normally, these areas are freely accessible to passengers, staff and third parties.

Ignition models 1 and 2 according to Annex A of EN45545-1 [N01] shall be considered.

Technical defect

This type of fire typically involves the ignition of a component by an electrical defect and thus an overheating of the component.

The ignition models 3 and 4 according to Annex A of EN45545-1 [N01] shall be considered.

Major fire events

This type of fire event is larger than those described in chapter 3.4.1 and chapter 3.4.2 incipient fires.

The ignition model 5 according to Annex A of EN45545-1 [N01] shall be considered.

Risk / hazard analysis

The evaluation method for determination of a risk priority number shall be compatible with CSM-RA (EU) 402/2013 and standards, such as EN 60812 or EN 50126-1.

In order to confirm the statement regarding the necessity of using the functional component in rail vehicle construction, the following information, among others, shall be taken into account in the assessment:

- Definition of safety objectives according to EN 45545-1 [N01];
- Design/ operating categories of the vehicle and the derived hazard level;
- Set of requirements and, if possible, deviations from the limit values;
- Presentation of the results obtained under Chapter 3.1 "Component description";
- Demonstration of the fire behaviour of the components in the form of an analysis of the results of already performed fire tests (national or European fire safety standards);
- Similar to EN 45545-1 [N01], a description of the potential ignition source is made in the installation area of the necessary functional component;
- Identification of risk minimisation measures;
- If necessary, further criteria have to be listed.

Evaluation method (example)

The basis of the risk / hazard analysis for the functionally necessary components is an adapted evaluation method based e.g. on EN 60812 or EN 50126-1. The classification for the application purpose can be divided into the following categories:



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- Severity/ meaning S
- Occurrence / probability of occurrence O and
- Detection/ probability of detection D

The risk priority number RPN for the evaluation method is determined by multiplying the three categories (RPN= S x O x D).

Examples for the grade in these categories and a definition of risk categories are given in the following tables.

Table 1: Example reference for the meaning S

Meaning / S	Criteria	Grade
	Insignificant; possible minor injury minor damage to the system	1
	marginal; minor injury and/or notable environmental threat serious damage to the system(s)	3
	critical; few fatal accidents and/or seriously injured and/or significant environmental damage, loss of a major system	5
	catastrophic; fatal accidents and/or numerous seriously injured and/or serious environmental damage	10

Table 2: Example reference for the probability of occurrence O

Probability of occurrence / O	Criteria	Grade
	unlikely; the occurrence is unlikely, but possible. It may be assumed that this danger only occurs in exceptional cases.	1
	rare; may sometimes occur during life cycle. It is advisable to be aware of occurring danger.	3
	occasional; may occur more than once. It is expected that danger occurs more than once.	5
	frequent; will occur frequently. The danger is always present.	10

Table 3: Example reference for the probability of detection D

Probability of detection / D	Criteria	Grade
	high; the incident is identified during formation in time by technology (BMA) or people	1
	little; the incident is detected delayed or detected by secondary incidents (e.g. smoke, smell)	3
	unlikely; the incident is hard to detect	5

Table 4: Example for definition of risk categories



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Risk priority number S x O x D	Value range	Category	Consequence
	>60	Intolerable	shall be excluded
	60....31	Undesirable	may only be accepted if a risk reduction is practically not feasible and an agreement of both, the railway company and the responsible supervisory authority for safety and security, is available Note: The IOD 2016/797 includes that the authorisation of a vehicle type/ vehicle can be granted without a railway company (=RU) participating. Therefore, the risk assessment of the RU shall be optional during TSI conformity assessment.
	30....16	Tolerable	acceptable with suitable monitoring and with the consent of the railway company
	5....1	Negligible	acceptable without further approval of the railway company

Installation situation

Explanation of the component description with the following information:

- Combustible mass;
- Installation area;
- Ignition sources in the installation area;
- Accessibility of the source of the fire (enclosure yes/no);
- Fire detection system/monitoring system;
- Fire-fighting system.

Implementation of the risk / hazard analysis

Execution of the risk / hazard analysis in relation to the functionally necessary components in the installation area.

- Showing the results of the available test certificates;
- Presentation of the ignition model;
- If necessary, pointing out compensation measures⁸;
- Influence on the required driving ability of the vehicle;

⁸ Normatively required systems do not serve as compensation measures, but can be used, for example, within the framework of the risk assessment should be taken into account in the probability of detection



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- Probability of occurrence: Operating experience with burning components in the installation space (frequency of fires);
- Justification of the values selected in each category and determination of the RPN.

Responsibilities

For the procedure, particular preparatory work is required for each evaluation step. In principle, the Applicant is responsible for the completeness and consistency of the documents in relation to the whole product. During the preparatory work, a distinction shall, however, be made between the responsible for the integration of the component in the end product, design and for material selection of a component, and for the production of the material. (It can happen that a company is simultaneously responsible for several tasks)

For these tasks, the Applicant may seek the support of suppliers.