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Railway applications — Recyclability and recoverability calculation method for rolling stock

Applications ferroviaires — Méthode de calcul de recyclabilité et valorisabilité pour matériel roulant

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 269, *Railway applications*, Subcommittee SC 2, *Rolling stock*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Rolling stock products are generally designed for operational safety, availability and reliability with the consideration to minimize any impact on society and environment. The treatment and environmentally sound disposal of end-of-life products are the desirable environmental priority of railway industry. This needs a common method to describe the end-of-life treatment of rolling stock products.

In order to benchmark the theoretical recyclability and recoverability of rolling stock, common calculation rules have been introduced in this document, which has been developed considering the work of UNIFE Life Cycle Assessment topical group between 2009 and 2011[5].

The calculation approach is based on common recycling practice. Throughout a life cycle perspective, the method adopts railway specific requirements for necessary material information.

End-of-life treatment processes are divided into three stages; pre-treatment, dismantling and shredding. Pre-treatment and dismantling calculations consider recycling and recoverability properties of the materials specific to these stages. At each stage, individual material flows are split into materials for recycling and materials for recoverability, depending on the availability of appropriate technology for recycling and/or recoverability. Therefore, knowledge of materials and dismantling of rolling stock or equipment is essential. The entire supply chain needs to be involved because material information is crucial when using this calculation method. This harmonized calculation method for recyclability and recoverability for rolling stock is intended to prevent misleading data gaps and contradictions.

The primary aim of this calculation method is for the rolling stock domain and other related interfaces with other subsystems.

The calculation method introduced by this document considers different end-of-life paths such as reuse, recycling and recoverability as well as treatment efficiencies at each stage. This means that this method is developed in order to take into account the efficiencies of recycling and recoverability technologies with regard to each material at the different end-of-life treatment stages. The recyclability and recoverability rates of rolling stock are each expressed as a percentage by mass (mass fraction in percent) after applying efficiency factors for each material of the rolling stock, which can potentially be reused, recycled or recovered.

Railway applications — Recyclability and recoverability calculation method for rolling stock

1 Scope

This document specifies a calculation method of recyclability and recoverability rates for rolling stock.

The method defined in this document applies to the design of new rolling stock. However, it can be applied to other existing rolling stock depending on available information. If calculation of recyclability or recoverability is applied to separate parts and/or products used in rolling stock and a specific calculation standard or method exists for the part and/or product, such standard or method can be applied, if relevant.

This calculation method is applicable regardless of any geographical concern.

This calculation method is applicable to any stage of life cycle of rolling stock. The calculated recyclability and recoverability rates are valid at the point of delivering the rolling stock products or equipment. Future recycling technologies or predicted trends with respect to the recycling industry are excluded from any consideration for this calculation method.

This calculation method considers the four main treatment processes, which are reuse, recycling, energy recovery and disposal (Figure 1). Process losses of recycling are treated in the disposal stage. The residue substances of the energy recovery stage (mostly ash and slag) and the residue of the incineration process of the disposal stage are most likely landfilled.

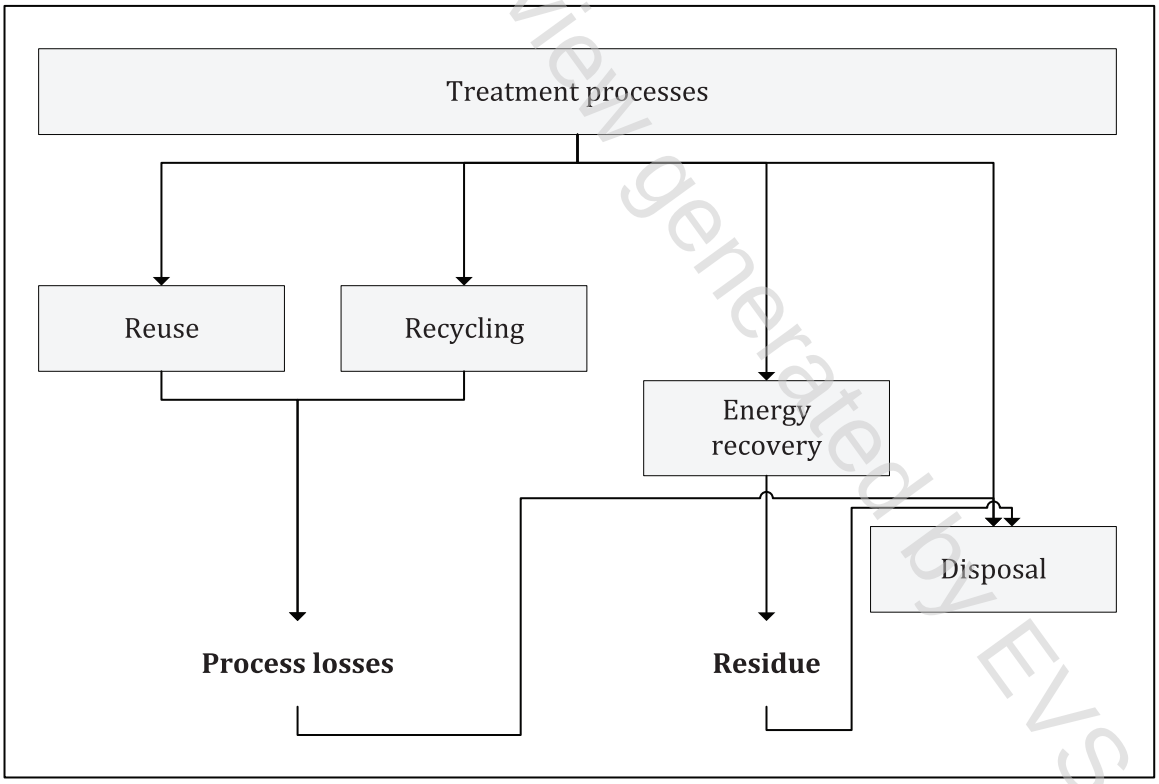

Figure 1 — End-of-life treatment

The application of this calculation method considers the rolling stock or equipment as delivered. Spare parts and/or maintenance parts necessary to keep the rolling stock in service over the entire life cycle,

e.g. brake pads, are not taken into account. Also, infrastructure systems like stations, electrification, signal and control units, etc. are excluded from the calculation (Figure 2).

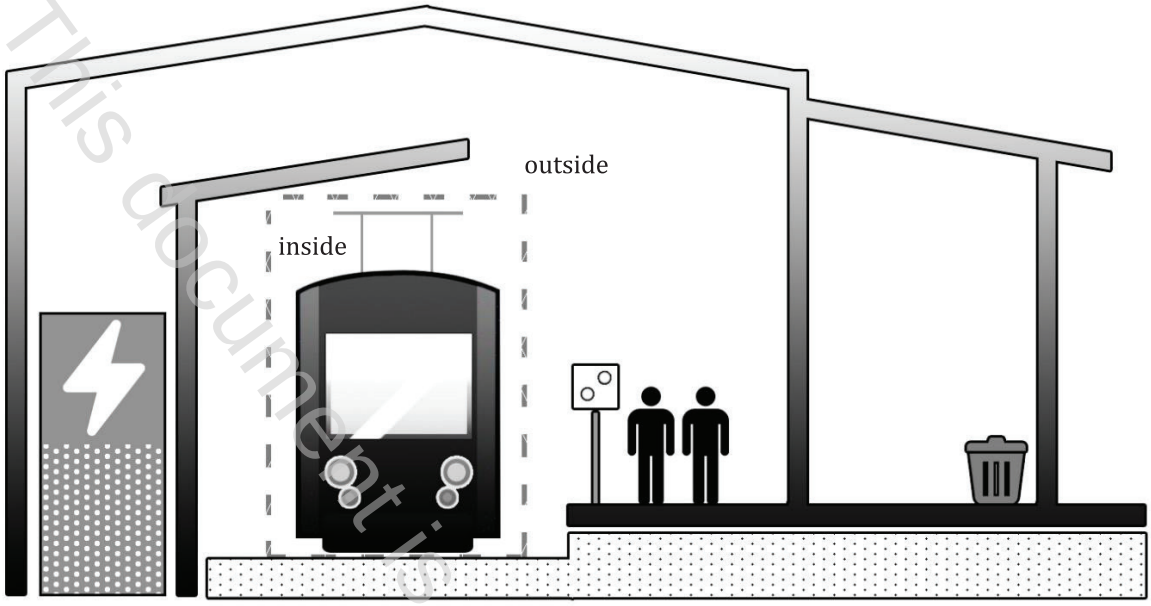

Figure 2 — Scope of the calculation

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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
design mass of rolling stock in working order
m_V
state of the complete mass of rolling stock equipped with all the consumables (e.g., fuel, oil, water, etc.) and without staff, passengers, and payload

[SOURCE: EN 15663:2017, 2.1.2.1, modified — The symbol has been amended and the mass of the staff is not included in the definition.]

3.2
reuse
use components of end-of-life rolling stock for the same purpose as that for which they were designed

Note 1 to entry: See ISO 22628.