
Železniške naprave - Sistem označevanja železniških vozil - 5. del: Sistemi; sistemske skupine - Sistemske zahteve

Railway applications - Classification system for rail vehicles - Part 5: Systems; System groups - System requirements

Bahnanwendungen - Kennzeichnungssystematik für Schienenfahrzeuge - Teil 5: Systeme; Systemgruppen - Systemanforderungen

Applications ferroviaires - Systèmes de classification pour véhicules ferroviaires - Partie 5: Systèmes ; Groupes des systèmes - Exigences des systèmes

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Ta slovenski standard je istoveten z: EN 15380-5:2014

ICS:

01.110	Tehnična dokumentacija za izdelke	Technical product documentation
45.060.01	Železniška vozila na splošno	Railway rolling stock in general

SIST EN 15380-5:2014**en,fr,de**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 15380-5

September 2014

ICS 01.110; 45.060.01

English Version

**Railway applications - Classification system for railway vehicles -
Part 5: System Breakdown Structure (SBS)**

Applications ferroviaires - Systèmes de classification pour
véhicules ferroviaires - Partie 5: Arborescence système
(SBS)

Bahnanwendungen - Kennzeichnungssystematik für
Schienenfahrzeuge - Teil 5: Systemstruktur

This European Standard was approved by CEN on 21 June 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Page

Foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Symbols and abbreviations	7
5 System Breakdown Structure (SBS)	7
5.1 General remarks	7
5.2 Classification used for system levels	8
5.3 Code letters	8
5.3.1 Letters used to identify 1st level systems	8
5.3.2 Letters used to identify 1st and 2nd level systems	9
5.4 Transverse elements	10
Annex A (informative) Attributes	12
Annex B (informative) Connections of FBS, SBS and PBS (Example)	14
Annex C (informative) Rules to define the system level	17
Bibliography	18

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Foreword

This document (EN 15380-5:2014) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2015 and conflicting national standards shall be withdrawn at the latest by March 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This series of European Standards EN 15380 "*Railway applications — Classification system for railway vehicles*" consists of the following parts:

- *Part 1: General principles*
- *Part 2: Product groups*
- *Part 3: Designation of train-set positions and installation sites*
- *Part 4: Function groups*
- *Part 5: System Breakdown Structure (SBS)*

NOTE EN 15380-2 refers to Product Breakdown Structure (PBS). EN 15380-4 refers to Functional Breakdown Structure (FBS).

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According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The System Breakdown Structure (SBS) provides the means of defining a railway vehicle in manageable and recognizable main systems and subsystems.

In addition to main systems and subsystems this document includes transverse elements, which result from the architectural design.

The SBS can be used to link functions according to EN 15380-4 to main systems and subsystems. The SBS is also used to associate subsystems with products. Examples of products or product groups are given in EN 15380-2.

The relationships of functions to the SBS and to the products depend on the architectural design of the railway vehicles.

As a result of the architectural design there will be different associations of products to subsystems. These different associations can be compared and evaluated. In addition the SBS provides a common stable structure “black box approach” for optimization of the train architecture.

The SBS with the other breakdown structures can be used at different stages of the vehicles life cycle. The SBS provides a common structure to be used by various stakeholders, e.g. authorities, operators, maintainers, integrators and suppliers.

The System Breakdown Structure according to EN 15380-5 (SBS), the Product Breakdown Structure according to EN 15380-2 (PBS) and the Functional Breakdown Structure according to EN 15380-4 (FBS) complement each other. These structures describe different views of railway vehicles.

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1 Scope

This European Standard defines the System Breakdown Structure for railway vehicles and their principal associated attributes.

This European Standard may also be applied to specific railway vehicles like track machines and snow ploughs. However, while the systems that are common with general railway vehicles are included, the systems which are specific to their work processes are not included in this European Standard. They need to be added for these individual projects.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50343, *Railway applications — Rolling stock — Rules for installation of cabling*

EN 81346-1:2009, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 1: Basic rules*

3 Terms and definitions

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

3.1

object

entity treated in a process of development, implementation, usage and disposal

[SOURCE: EN 81346-1:2009, 3.1, modified — Notes 1 and 2 to entry have been omitted]

3.2

system

set of interrelated objects considered in a defined context as a whole and separated from their environment

Note 1 to entry A *system* is generally defined with a view to achieve a given objective, e.g. by performing a definite function.

Note 2 to entry Examples of a system: A drive system, a water supply system, a stereo system, a computer.

Note 3 to entry The *system* is considered to be separated from the environment and from the other external *systems* by an imaginary surface, which cuts the links between them and the *system*.

Note 4 to entry The term *system* should be qualified when it is not clear from the context to what it refers, e.g. control system, colorimetric system, system of units, transmission system.

Note 5 to entry When a *system* is part of another *system*, it may be considered as an *object* as defined in this standard.

[SOURCE: EN 81346-1:2009, 3.2, modified — Note 2 to entry has been changed]

3.3

structure

organization of relations among *objects* of a *system* describing constituency relations (consists-of/ is-a-part-of)

[SOURCE: EN 81346-1:2009, definition 3.9]

EN 15380-5:2014 (E)

3.4

product

intended or accomplished result of labour, or of a natural or artificial process

Note 1 to entry In the context of this standard the term refers to the industrial *process* (assembly, construction, installation, etc.) through which an *object* is realized.

[SOURCE: EN 81346-1:2009, 3.6, modified — NOTE 1 to entry has been added]

3.5

product-oriented structure

based on the way a system is implemented, constructed or delivered using semi-finished or finished components

Note 1 to entry A product-oriented structure shows the subdivision of the system into constituent objects with respect to the product aspect without taking into account possible function and/or location aspects of these objects.

Note 2 to entry Documents in which the information on a system is organized in accordance with a product-oriented structure highlight the physical arrangements of the components of that system.

3.6

requirement

necessary condition or ability to constrain the solutions of a task or an aim

Note 1 to entry A requirement describes for example, performance characteristics, operational conditions and quality attributes, expressed as measurable and testable technical parameters or indicators.

Note 2 to entry Requirements are usually summarized in a specification.

Note 3 to entry Beside requirements allocated to functions, additional requirements are allocated to other features (e.g. design, manufacturing).

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3.6.1

system requirement

requirement on a system, subsystem or device

Note 1 to entry Requirement on a system, subsystem or device regarding the requested technical compatibility, reliability, availability, maintainability, environmental impact/conditions (recyclables, emissions, EMC, climate, vibration), LCC, performance, quality, documentation, realtime behaviour, physical limits (dimension, weight), electrical interface (plugs, voltage, physical layer), or mechanical interface (fixing points, fixing method).

3.7

system breakdown structure (SBS)

hierarchical structure summarising a set of systems

3.8

system level

level of group systems

Note 1 to entry Assignment to the appropriate level is described in the rules.

3.9

1st level system (main system)

main system that provides the key characteristics of the railway vehicle like functions, performance

Note 1 to entry A railway vehicle is built up of main systems.

3.10**2nd level system (subsystem)**

system that provides the key characteristics of a main system

Note 1 to entry A main system is built up of subsystems.

3.11**transverse element**

element that is common to a number of main systems or subsystems

Note 1 to entry For more information see 5.4.

3.12**attribute**

key characteristic usually defining performance parameters or boundary conditions applicable to consist and system levels

Note 1 to entry For more information see Annex A (informative).

3.13**boundary condition**

non-influenceable condition which has to be taken into account as a given parameter

3.14**consist**

single vehicle or a group of vehicles that are not separated during normal operation; train set and rake of coaches are synonyms

EXAMPLE The vehicles of a consist are permanently connected in a workshop. These consists may form a train using for instance automatic couplers, which may be performed during operation.

[SOURCE: EN 50463-4:2012, 3.1.2, modified — Note 1 to entry omitted and example has been added]

4 Symbols and abbreviations

FBS	Functional Breakdown Structure
SBS	System Breakdown Structure
PBS	Product Breakdown Structure
FRS	Functional Requirement Specification

5 System Breakdown Structure (SBS)**5.1 General remarks**

The hierarchy of the SBS serves as a guideline when creating system structures. Systems realize functions at a high technical level as hardware and software within hierarchically structured units. Although the units interact at the functional level, they may be spatially separate from one another.

Expanding the systems and subsystems is possible within the scope of this standard. Whether it is necessary to make use of this option will depend on the specific application being considered.

Changes of the existing set of main systems and subsystems as defined in this standard shall not be permitted.

EN 15380-5:2014 (E)

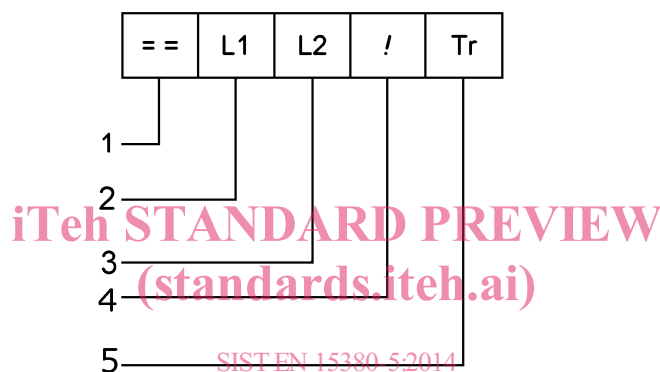
In the case the design solution requires transverse elements (see 3.11) the specific system breakdown structure comprises the system breakdown structure according to EN 15380-5 (SBS) expanded by the transverse elements.

5.2 Classification used for system levels

System levels are identified by using letters of the alphabet only, as set out in Table 1 and Table 2. The use of the letters I and O, as well as special characters and separators, is not permitted.

The 1st level systems and 2nd level systems and transverse elements are coded in their respective levels using a single letter. If transverse elements are applicable for each system, several lines with related transverse elements can be added in the following way, e.g. = GA/V,GA/S, where GA is the identifier for SBS and V, S are the identifiers for the transverse element contained in 5.4, Table 3. If no transverse element is used the identification in this example is = GA.

The classification systems can be used either in whole or in part. As a minimum, it is recommended to use it with both level 1 and level 2.



Key

- 1 sign „system“ according to EN 81346-1 (Rule 16)
- 2 1st level system according to 5.3.1
- 3 2nd level system according to 5.3.2
- 4 separator between system and transverse element
- 5 level 1 transverse element according to 5.4

Figure 1 — Precept of system level identification

5.3 Code letters

5.3.1 Letters used to identify 1st level systems

The first level systems are specified using the letters as listed in Table 1.

Table 1 — 1st level systems

Ident of 1 st level systems	1 st level systems
B	Car body
C	Doors/Loading
D	Guidance
E	Interiors
F	Lighting
G	Energy supply
H	Propulsion and braking
J	Information and communication
K	Train control
L	Coupling and interconnection

5.3.2 Letters used to identify 1st and 2nd level systems

The main system and subsystem levels are specified using the letters as shown in Table 2.

Table 2 — 1st and 2nd level systems
(standards.itech.ai)

Level		System	Example / explanation
L1	L2		
B	A	Car body	Including Front/Rear Module if applicable
B	B	Car body shell	
B	C	Crash energy absorption	
B	D	Aerodynamic System	including components supporting aerodynamics
B	E	Windows	
B	F	Windscreens	
C	A	Doors/Loading	
C	B	Exterior doors	
C	C	Interior doors	
C	D	Loading system	
D	A	Guidance	
D	B	Running gear	
D	C	Running gear connection	
D	D	Running gear auxiliary components	
E	A	Interiors	
E	B	Floors and stairways, vestibules	