![SIST logo]

# SLOVENSKI STANDARD
# oSIST prEN 15016-4:2022

## 01-marec-2022

**Železniške naprave - Tehnična dokumentacija - 4. del: Izmenjava podatkov**

Railway applications - Technical documents - Part 4: Data exchange

Technische Zeichnungen - Bahnanwendungen - Teil 4: Datenaustausch

Dessins techniques - Applications ferroviaires - Partie 4 : Echange des données

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

**Ta slovenski standard je istoveten z:    prEN 15016-4**

**ICS:**

| | | |
|---|---|---|
| 01.100.01 | Tehnično risanje na splošno | Technical drawings in general |
| 35.240.60 | Uporabniške rešitve IT v prometu | IT applications in transport |
| 45.020 | Železniška tehnika na splošno | Railway engineering in general |

**oSIST prEN 15016-4:2022**                    **en,fr,de**

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

**DRAFT
prEN 15016-4**

January 2022

ICS 01.100.01; 35.240.60; 45.020

Will supersede EN 15016-4:2006

English Version

# Railway applications - Technical documents - Part 4: Data exchange

Dessins techniques - Applications ferroviaires - Partie 4 : Echange des données

Technische Zeichnungen - Bahnanwendungen - Teil 4: Datenaustausch

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

Ref. No. prEN 15016-4:2022 E

prEN 15016-4:2022 (E)

# Contents

2

## European foreword

This document (prEN 15016-4:2022) 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 CEN Enquiry.

This document will supersede EN 15016-4:2006.

In comparison with the previous edition, the following technical modifications have been made:

— The scope has been changed to rolling stock because this is the typical application field.

— The data model has been completely revised to simplify the data exchange by focusing on the necessary data. Data tables for additional data have been introduced to enable a scalable use of the data model.

— The purpose of the data model is the structured exchange of item data. The same data model now also supports the structured exchange of technical document data.

— Rules have been specified to ensure and to check the consistency of the data model.

— A detailed application guide has been incorporated to ensure an easy implementation.

— Because the data exchange is handled by data processing systems an example for layout for a table of documents and an example for entries in a table of documents is superfluous and has therefore been deleted.

This document is part of the standard series "Railway applications — Technical documents" which consists of the following parts:

— EN 15016-1: General principles;

— EN 15016-2: Parts lists;

— EN 15016-3: Handling of modifications of technical documents;

— EN 15016-4: Data exchange.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

## Introduction

In railway business, the parties require, as part of a contract, bill of material and technical documents. To support co-operation and effective data exchange of information between customers, suppliers and partners, it is necessary to have the data exchange precisely defined.

In European directives, the term "Technical Files" is mainly used to summarize types of documents, drawings, data, reports, etc.

Three main classes of data can be distinguished:

a) Technical data and documents;

b) Maintenance data and documents;

c) Authorization documents, reports, assessments, and safety data.

This document will support the exchange of bill of material and technical documents between two parties.

The aim of this document is to improve cooperation with respect to time, quality, and costs for the whole railway sector (e.g. railway users, manufacturers, rail system operators, entities in charge of maintenance).

This document covers exclusively the specification of the data model of the data exchange process between two parties. Common project management or contractual arrangements aspects like data content or the handling of change management are not covered.

This document refers to EN, ISO or IEC standards dealing with data fields. In cases where ISO or IEC standards are not sufficiently precise, this document gives specific details. These additions to EN, ISO and IEC standards facilitate the exploitation and the administration of the data exchange.

These requirements have been drawn up in order to accommodate:

— the large variety of users;

— ease of transfer of documents;

— any specific series of documentation related to rolling stock.

**prEN 15016-4:2022 (E)**

## 1   Scope

This document specifies the data exchange of technical documents such as bill of material, technical drawings and other related technical documents for rolling stock.

## 2   Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 17343:2020, *Railway applications - General terms and definitions*

prEN 15016-1:2021 [1], *Railway applications - Technical documents - Part 1: General Principles*

ISO 639-1:2002, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

## 3   Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17343:2020, prEN 15016-1:2021 and the following apply.

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

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

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

**3.1**
**item**
subject being considered

Note 1 to entry: The item may be an individual part, component, device, functional unit, equipment, subsystem, or system.

Note 2 to entry: The item may consist of hardware, software or any combination thereof.

[SOURCE: IEC 60050-192:2015, 192-01-01, modified — Note 2 to Note 5 to entry have been deleted, in Note 1 the term people has been deleted.]

**3.2**
**bill of materials**
**BOM**
documented formal hierarchical tabulation of the physical assemblies, subassemblies, and components needed to fabricate a product

Note 1 to entry: The BOM consists of items and therefore may include software.

[SOURCE: ISO/IEC/IEEE 24765:2017(en), 3.378, modified — Note 1 to entry added]

---

[1] Under preparation.

## 4 Symbols and abbreviated terms

OEM     original equipment manufacturer

## 5 Administration of distributed information

### 5.1 General

This Clause describes the organizational and administrative basics of data exchange according to this standard.

Typically, the source of and target to store the exchanged data are

— PDM (Product Data Management)

— and PLCS (Product Life Cycle Support).

Methods and tooling for retrieving the exchanged data into the receiver repository (like import tool, required mappings, etc.) are not described in this standard.

### 5.2 Parties

From the origin of the data (OEM) to the final recipient (final customer) there can be a complex chain of multiple data shipments, in different levels (tiers) along the value chain. Within this chain there are 4 types of parties (2 dynamic and 2 static):

| | |
|---|---|
| Static - OEM: | The original equipment manufacturer of an item/ the legal owner of a document. Only one OEM is possible per item/ document. |
| | If this field is empty, this is automatically the Data Supplier. |
| Static - Final customer: | The final recipient of the item/ document (e.g. the operator of the rolling stock). |
| | It is an optional attribute, that can be added between the submissions and need to be defined by contract. |
| | The final customer is the same for all items/ documents of one shipment. |
| Dynamic - Data Supplier: | The party that supplies the shipment |
| | Item independent shipment information |
| Dynamic – Data Recipient: | The party that receives the submission |
| | Item independent shipment information |

Figure 1 shows examples of data shipments between four parties.

Table 1 shows the allocation of the shipment parties to the party types for the examples in Figure 1.

Party 1 is the OEM.

Party 4 the final customer.

Party 2 receives data from the OEM (shipment 1), adds the final customer information.

Party 3 receives the data from Party 2 (shipment 2).

The final customer receives data from Party 3 (shipment 4) including data form Party 2 and the OEM.

The shipment 3 shows a cyclic data exchange between party 2 and 3 with bidirectional shipments.
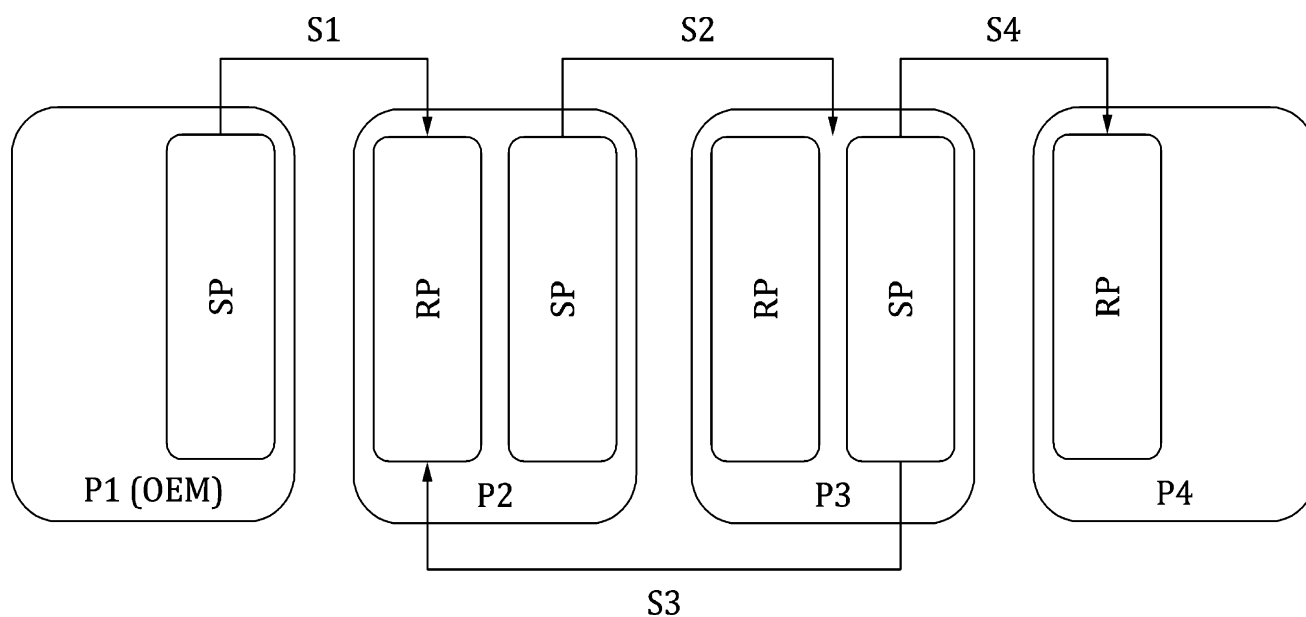


**Key**

| | |
|---|---|
| S | Shipment |
| P | Party |
| OEM | Original Equipment Manufacturer |

| | |
|---|---|
| SP | Supplier |
| RP | Recipient |

**Figure 1 — Examples of shipments**

**Table 1 — Examples of data shipments**

| | | Shipment 1 | Shipment 2 | Shipment 3 | Shipment 4 |
|---|---|---|---|---|---|
| Static | OEM | Party 1 | Party 1 | Party 1 | Party 1 |
| | Final Customer | - | Party 4 | Party 4 | Party 4 |
| Dynamic | Supplier | Party 1 | Party 2 | Party 3 | Party 3 |
| | Recipient | Party 2 | Party 3 | Party 2 | Party 4 |

## 5.3 Transfer organization

### 5.3.1 General

This exchange method is a snapshot of the contents of the design. There are no requirements about history of change management (only the valid version of each piece of information is required).

Before exchanging data, the parties shall accept the scope of the exchange on each project:

— Data supplier (Organization ID);

— Data recipient (Organization ID);

— Configuration Data (Applicability);

— Technical Scope (components, sub-system, vehicles, unit, etc.);

— Languages of documents;

— Organization for document repository (Directory, media, authorized formats, etc.);

— Planning of submission;

— Identifier for parts (Numbering schemes and unicity rules);

— Common description for items ;

— Data review process ;

— Request for Change Management.

### 5.3.2 Configuration Management

The data exchanged here will be classed in as "Design Data" with the following parameters:

— Contract Identification;

— Class of Rolling Stock;

— Sub Class of Rolling Stock (if applicable);

— Effectivity (if applicable).

### 5.3.3 Rules for Data

This exchange data model is versatile. Extra fields may be added in the provided data tables(see 6.3).

Written rules shall be exchanged between parties:

— To agree on the use of data fields with the "importance" values R (recommended) or I (informative), see 6.2.1;

— to ensure a consistent model on the non-standard requirements.

## 5.4 Protocol

To track every shipment, besides the data in the Shipment Data Table (see 6.2.2), a handover protocol (e.g. in pdf format) may be added to it. The format of the exchange protocol can be company specific and should contain at least the following information if applicable:

— Org ID data Supplier;

— Org ID data Recipient;

— Title of Submission;

— Top Item/ Document in Data Table B/C/D;

— Contract Reference;

— Vehicle reference;

— Date of Snapshot/ data extraction;

— Languages 1, 2, 3;

— Modules included;

— Number of files in Data Table F.

## 5.5 Shipment review

When the recipient checks and or imports the exchanged data, errors or quality issues can occur. Then a request for clarification\error correction can be submitted to the data supplier.

Request for clarification (RfC) shall contain:

a)   Organization identification code of data recipient;

b)   Request Identification (Unique Identifier of data recipient);

c)   Contract identification;

d)   Shipment date;

e)   Document identification;

f)   Document Version;

g)   Document Date;

h)   Shipment error class;

i)   Request Description.

If the data supplier accepts the RfC, the two fields (Organization Identification Code and Request identification) shall be noted in the new data (if needed) and delivered in the relevant fields (depending on the class of notification).

Shipment error class shall contain:

j)   Import errors;

k)   Documents analysis and review;

l)   Documents Breakdown analysis and review;

m)  Items Breakdown analysis and review;

n)   Missing items;

o)   Missing Documents;

p)   Shipment Consistency in table.

## 6 Data Model

### 6.1 General

#### 6.1.1 Structure of Data Model

Starting point for the exchange model is the principle that the design of the rolling stock is represented by a structured list of items down to its most basic (i.e. lowest level) items necessary to maintain, repair or overhaul the rolling stock during its complete lifetime. This structured list of items is called the (engineering) Bill Of Material (BOM). In this document the materials are referred to as items (to not mix them up with the term material used to define the substance/raw material an item is made of).

In the data model this BOM is represented by a so-called Parent-Child relation. This means that each record of the BOM consists of a Child and its Parent. If a Parent has more than one Child, then there are as many records with that Parent as there are Children of that Parent. A Parent needs to have at least one Child. Each Child thereafter can be the Parent for a deeper level in the structure, until the lowest level in the structure is reached. So, the top of the structure is always a Parent and the lowest level is always a Child. Table 2 shows an example of a table with a Parent-Child relation. Figure 2 shows this relation in a graphical representation.

**Table 2 — Example of Parent – Child relations**

| Parent | Child |
|---|---|
| Train set | Rail vehicle 1 |
| Train set | Rail vehicle 2 |
| Rail vehicle 1 | Bogie 1 |
| Rail vehicle 1 | Bogie 2 |
| Rail vehicle 2 | Bogie 1 |
| Rail vehicle 2 | Bogie 2 |
| Bogie 1 | Axle 1 |
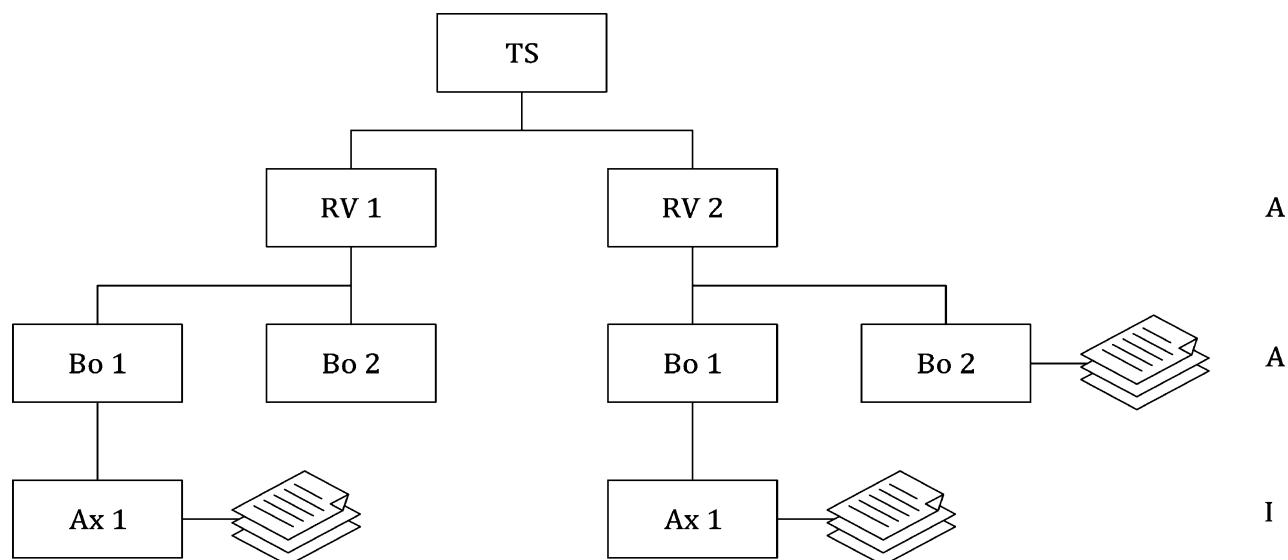
**Key**

| | | | |
|---|---|---|---|
| A | Assembly | RV | Rail vehicle |
| I | Item | Bo | Bogie |
| TS | Train set | Ax | Axle |

**Figure 2 — Examples of Parent – Child relations**

Each level in the structure shall be specified. This specification consists of features (meta data) and/or documents that are linked to the item. Each document shall be linked to the item on the level it describes e.g. the drawing of the complete assembly of the bogie shall be linked to the item for the complete bogie and the production drawing for the wheelset axle shall be linked to the item for the bare axle (see Figure 2).

However sometimes there is a need to also exchange document structures. Therefore, the model also supports this type of exchange.

Not supported is the exchange of combined structures (items and documents in one single structure) because documents can be linked to an item rather than adding them as a position in the structure. However, by exchanging both an item structure and one or more document structure(s) and linking the Parent documents to items, a relation can be built between the item structure and one or more document structure(s).

The exchange model is designed in such a way that it can enable the supplier of the data to break down the configuration out of his own data systems into logical data tables and enable the receiver of the data to rebuild the configuration in his own data systems, without loss of information.

To minimize the amount of repetitive data, the data are split up in several data tables that are linked through key-field (see Figure 3 and Figure 4).
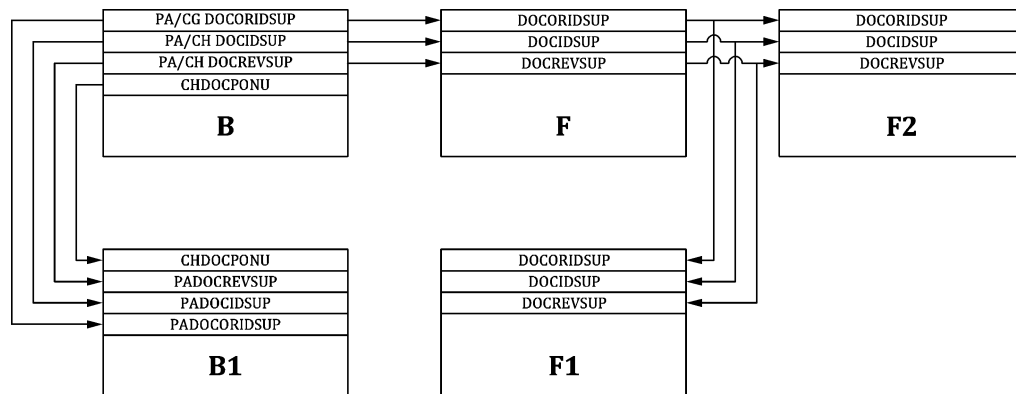
**Key**

| | | | | | |
|---|---|---|---|---|---|
| B | Document Structure | F | Document Data | PA | Parent |
| B1 | Document structure additional data | F1 | Additional Document Data | CH | Child |
| F2 | Files | | | | |

**Figure 3 — Links for document structure**
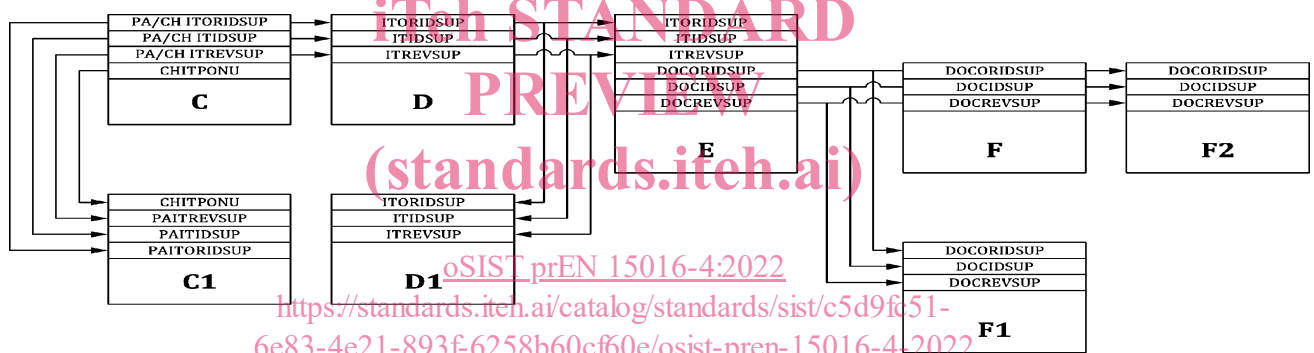
**Key**

| | | | | | |
|---|---|---|---|---|---|
| C | Item Structure | E | Item - Document relation | PA | Parent |
| C1 | Item structure additional data | F | Document Data | CH | Child |
| D | Item Data | F1 | Additional Document Data | | |
| D1 | Additional item Data | F2 | Files | | |

**Figure 4 — Links for item structure**

Also, extra attributes can be added to the different objects in the different data tables by means of additional data tables, linked to each main data table (e.g. Table A.2 (Data Table A1) with additional attributes for Table A.1 (Data Table A)),

In 6.2 all the separate data tables are described in detail.

**6.1.2 Units**

Basic units and their multiples for unit attributes are listed in Table 4.

If different units are required/ used, these needs to be converted into/ from the ones in the table in the import/ export interface.