SLOVENSKI STANDARD
oSIST prEN 17549-2:2022

01-januar-2022

Informacijsko modeliranje gradenj - Informacijska struktura, ki temelji na EN ISO 16739-1, za izmenjavo podatkovnih predlog in podatkovnih listov za gradbene objekte - 2. del: Prilagodljivi gradbeni objekti in zahteve

Building information modelling - Information structure based on EN ISO 16739 1 to exchange data templates and data sheets for construction objects - Part 2: Configurable construction objects and requirements

Building Information Modeling - Datenstruktur für den Austausch von Produktdatenvorlagen und Produktdatenblättern nach EN-ISO 16739-1 - Teil 2: Anforderungen und konfigurierbare Produkte

Modélisation des informations de la construction (BIM) - Structure des informations basée sur l'EN ISO 16739-1 pour l'échange de modèles de données et de feuilles de données pour les objets de construction - Partie 2 : Objets de construction configurables et exigences

Ta slovenski standard je istoveten z: **prEN 17549-2**

ICS:

35.240.67	Uporabniške rešitve IT v gradbeništvu	IT applications in building and construction industry
91.010.01	Gradbeništvo na splošno	Construction industry in general

oSIST prEN 17549-2:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 17549-2

November 2021

ICS 35.240.67

English Version

Building information modelling - Information structure based on EN ISO 16739 1 to exchange data templates and data sheets for construction objects - Part 2: Configurable construction objects and requirements

Building Information Modeling - Datenstruktur für den Austausch von Produktdatenvorlagen und Produktdatenblättern nach EN-ISO 16739-1 - Teil 2: Anforderungen und konfigurierbare Produkte

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 442.

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

Contents

Page

European foreword

This document (prEN 17549-2:2021) has been prepared by Technical Committee CEN/TC 442 “Building Information Modelling (BIM)”, the secretariat of which is held by SN.

This document is currently submitted to the CEN Enquiry.

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in ISO/IEC Directives, Part 2, 2016.

SHALL is the strongest expression (Requirement)

MAY is to permit something

MUST means something to apply for legal reasons

CAN expresses a possibility

SHOULD is a recommendation

Requirements – shall, shall not

Recommendations – should, should not

Permission – may, need not

Possibility and capability – can, cannot

Introduction

This document is a technical Model View Definition (MVD) of EN ISO 16739-1:2020. It aims to set a comprehensive digital structure to store and exchange Construction Object Data Views. It is intended for software publishers for the construction sector as well as professionals in this sector using their software.

While “Building information modelling — Information structure based on EN ISO 16739-1:2020 to exchange data templates and data sheets for construction objects — Part 1” focuses on data templates and configured construction objects, this document includes the structures that shall be used to:

- link the objects and properties to their semantic definitions through data dictionaries
- express requirements and describe configurable construction objects using declarative expressions
- organize the data exchanged during business workflows

The model view defined by this document can be designated as CODview-2.

It selects a few technical IFC classes to leverage the maximum potential from Building Information Modelling (BIM):

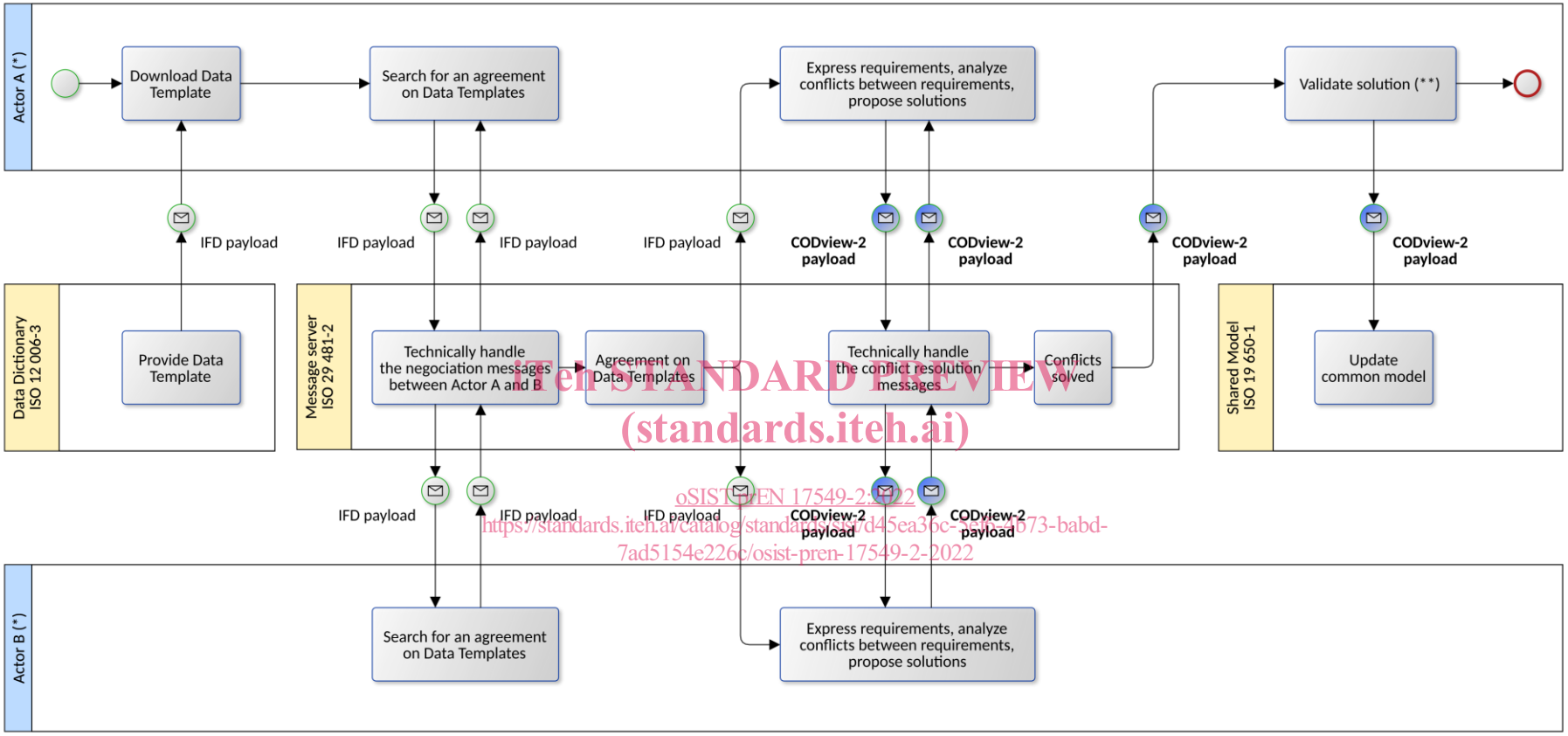
It aims to provide access to dynamic business semantics. For this it uses the complementarity between the underlying EN ISO 16739-1:2020 standard and the EN ISO 12006-3 for data dictionaries, thereby outsourcing business semantics of the schema. The use of EN ISO 12006-3 is extended to the negotiation of Data Templates to agree on a common language prior to data exchanges. These data exchanges can concern construction projects as well as catalogues of construction products.

It aims to ease concurrent engineering by allowing the expression of requirements. For this it highlights the use of constraints especially in the perspective of data exchanges related to business processes (EN ISO 29481-2) and the traceability of decisions in models. These constraints make it possible to express requests relating to construction projects or product catalogues. At last, they may also be used to describe configurable products.

It aims to integrate into workflows as described in EN ISO 19650-1.

These three aspects make it possible to achieve interoperability of data used in software for the construction and operation sector.

Figure 1 shows the general workflow of exchanges between actors willing to agree on a construction object. It involves several standards (EN ISO 12006-3, EN ISO 29481-2, EN ISO 19650-1). The exchanges using the CODview-2 standard appear as “CODview-2 payloads” in this figure.



(*) Only two actors (actor A and Actor B) are represented in this schema. However, many more actors may be involved in such an exchange. Actor C, D, E ... may also have their own requirements and participate to the exchange. Actors can be any actor of the project: clients, architects, engineers, contractors, manufacturers ... or even machines like product catalogues.

(**) In this schema actor A validates the solution. Many alternatives may exist in a real business process. For example, the validation could belong to an actor C that has not been involved in the exchange.

See Example E.2.3. Semantic, concurrent, and iterative definition of an object during design phases.

Figure 1 — General workflow of exchanges between actors willing to agree on a construction object

1 Scope

With EN ISO 16739-1:2020 exists an open language to design, transfer and maintain construction models. This document is a simplification of EN ISO 16739-1:2020 from an information technology point of view and as such is a Model View Definition (MVD). It focuses on core classes and relies on external data dictionaries to describe business semantics.

Thanks to this MVD several objectives of Building Information Modelling (BIM) can be achieved:

- Less complex implementations without reduction of functionality,
- Agile integration of business semantics leading to more comprehensive interoperability for the end user,
- Support concurrent engineering by using already existing mechanisms.

The users of the tools based on this MVD are able to:

- Use their specific business semantics thanks to the use of data dictionaries,
- Express their requirements and proposals related to construction objects,
- Describe parametric construction objects as well as configurable construction objects or products,
- Import and export construction object data in BIM models at any stage of the project (design, construction, operation),
- Describe bills of quantities (pre-design programs, technical specifications, offers),
- Call for tender and purchase construction objects,
- Check that the construction objects included in a project meet previously described requirements,
- Describe product catalogues originally described in accordance with Part 1.

These scenarios fit in the business models of owners, designers, builders, manufacturers, and facility managers.

This document does not provide any data template as it considers that these are already defined in data dictionaries compliant with EN ISO 12006-3.

This document focuses only on the format of the exchanged data and not on the way to process them.

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 ISO 12006-3, *Building construction — Organization of information about construction works — Part 3: Framework for object-oriented information*

EN ISO 16739-1:2020, *Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries — Part 1: Data schema*

ISO 6707-1:2017, *Building and civil engineering words — Part 1: General terms*

ISO 8601-1:2019, *Date and time — Representations for information interchange — Part 1: Basic rules*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 6707-1 and the following 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 Terms and definitions

3.1.1
attribute
data element for the computer-sensible description of a property, a relation, or a class

[SOURCE: ISO 22274:2013, 3.2]

3.1.2
configurable construction object
construction object for which some properties have no explicit values but are implicitly defined by constraints

3.1.3
constraint
logical expression that restricts the possible values for one or several properties

3.1.4
construction object
object of importance to the construction industry

3.1.5
construction object data view 2
technical Model View Definition that defines a comprehensive digital structure to store and exchange configurable objects and requirements data for Building Information Modelling

3.1.6
data dictionary
centralized repository of information about data such as meaning, relationships to other data, origin, usage, and format

[SOURCE: EN ISO 23386:2019]

3.1.7
data sheet
populated data template

3.1.8
data template
schema providing a data structure used to describe the properties of construction objects

[SOURCE: EN ISO 23387:2019 , modified – The word “construction” has been added.]

3.1.9
entity
class of information defined by common attributes and constraints

[SOURCE: ISO 10303-11]

Note 1 to entry: Similar to the term “class” in common programming languages.

3.1.10
model view definition
defined subset of IFC to fulfil a purpose

3.1.11
object
any part of the perceivable or conceivable world

[SOURCE: EN ISO 12006-2:2020, 3.1.1]

Note 1 to entry: An object is something abstract or physical toward which thought, feeling, or action is directed.

3.1.12
object type
range of objects defining values that can be inherited by the related objects

Note 1 to entry: A type acts like a style for the objects related to it. Objects defined by a type may override the values of the type.

3.1.13
product
tangible outcome of a process

[SOURCE: ISO 6707-3:2017, 3.3.1]

3.1.14
property
inherent or acquired feature of an object

[SOURCE: ISO 6707-1:2017, 9.1.3, modified – The word “item” has been replaced with “object”.]

3.1.15
semantic relationship
relationship, between construction object or between construction object types, with a definition in a data dictionary

3.2 Abbreviated terms

CODview-2	construction object data view 2
GUID	globally unique identifier
IFC	industry foundation classes
IFD	international framework for dictionaries
JSON	JavaScript object notation
MVD	model view definition

4 Fundamental concepts and assumptions

4.1 General

This document is a model view definition (MVD) of the IFC schema. As such, it is a subset of the entities defined in EN ISO 16739-1:2020 (IFC). It consists of a schema defining entities, along with common concepts indicating their use for particular scenarios.

This clause defines common concepts, which are applied to entities having specific use. Each concept defines a graph of entities and attributes, with constraints and parameters set for particular attributes and entities. Various entities within this schema reference such concepts and adapt them for particular use.

The cardinalities appearing in the instance diagrams are the original cardinalities of the IFC schema. They may be overridden by existence assumptions and by entity definitions established by this MVD.

The entities defined in this MVD shall be used to store and exchange data related to construction as a process or as the result of this process. This includes data describing:

- construction objects, whether objects or object types,
- configurable construction objects,
- requirements relating to objects and object types.

The corresponding data sheet shall be structured following a data template defined in a data dictionary conforming to EN ISO 12006-3.

All data shall be defined in a data dictionary conforming to EN ISO 12006-3.

This MVD does not provide any entity with business semantics and external data dictionaries based on EN ISO 12006-3 are unique sources of business semantics.

EN ISO 12006-3 data dictionaries are used to link to the business definitions of:

- properties,
- property definition constraints,
- groups of properties,
- groups of groups,
- semantic relationships between groups.

Such links are defined using *IfcLibraryReference* which contain the GUIDs identifying the definitions.

This document selects this mechanism to refer to elements of data dictionaries. Hence, IFC template classes are not part of this MVD and shall not be used.

NOTE 1 If needed, it might be useful to make a copy of the definitions referenced in the IFC file using the data schema defined in the EN ISO 12006-3 standard. For example when the exchanged data are parts of a contract this copy can be included in the data exchange. In the same way, if the long term existence of online data dictionaries is a potential problem, this copy can be kept as a backup.

NOTE 2 For example, regulatory constraints are business constraints. Currently it is not possible to describe business constraints in data dictionaries. On the other hand, it is possible to define restrictions on the possible values of the properties by lists or intervals. Such restrictions are called “definition constraints” to distinguish them from business constraints.

The diagram below, see Figure 2, provides a high-level representation of the Construction Object Data View 2 (CODview-2) global schema. It shows the main concepts that are involved in this document. They are described in more details in this clause.

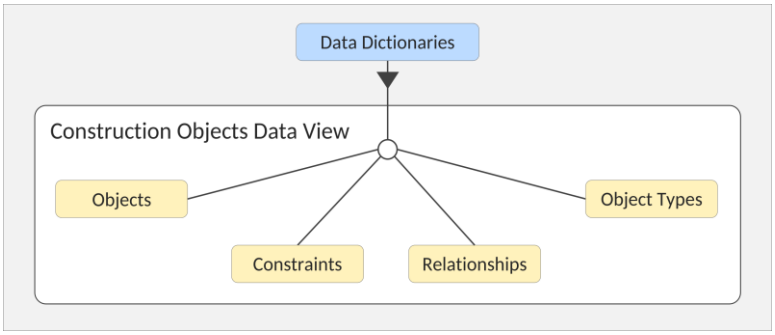


Figure 2 — High-level representation of the CODview-2 global schema

When addressing specific goals as descriptions and exchanges of catalogues of products, this schema may be reduced.

For example, in the case of product catalogues, we only have object types as the actual objects belong to the projects, see Figure 3.

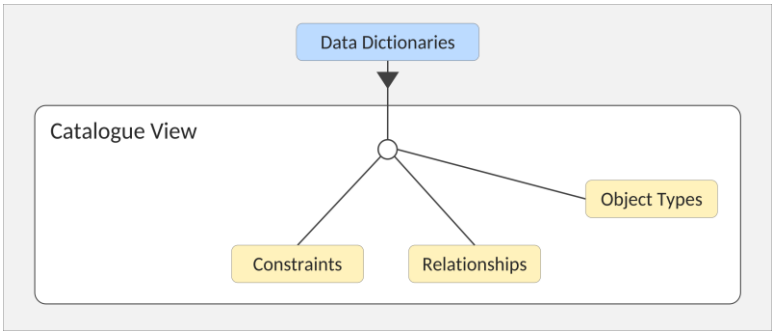


Figure 3 — High level representation of the CODview-2 schema for product catalogues

The relationships between the entities defined by EN ISO 12006-3 and CODview-2 entities are described by the 5 following diagrams.

Figure 4 shows an example in which a small fraction of a heating system is modelled. In this example, the heating system consists of two components, a radiator, and a controller. The radiator is driven by the controller which is indicated in the model by the is-driven-by relationship. This relationship is bound to the radiator, in other contexts it might be not useful. Only the radiator is further specified in the model: There are two groups of properties, geometric and thermal properties, and two examples for the thermal properties are given, the water input temperature, which is constraint to be in the range of 0 °C and 70 °C, and the performance class with the allowed values A, B, and C.

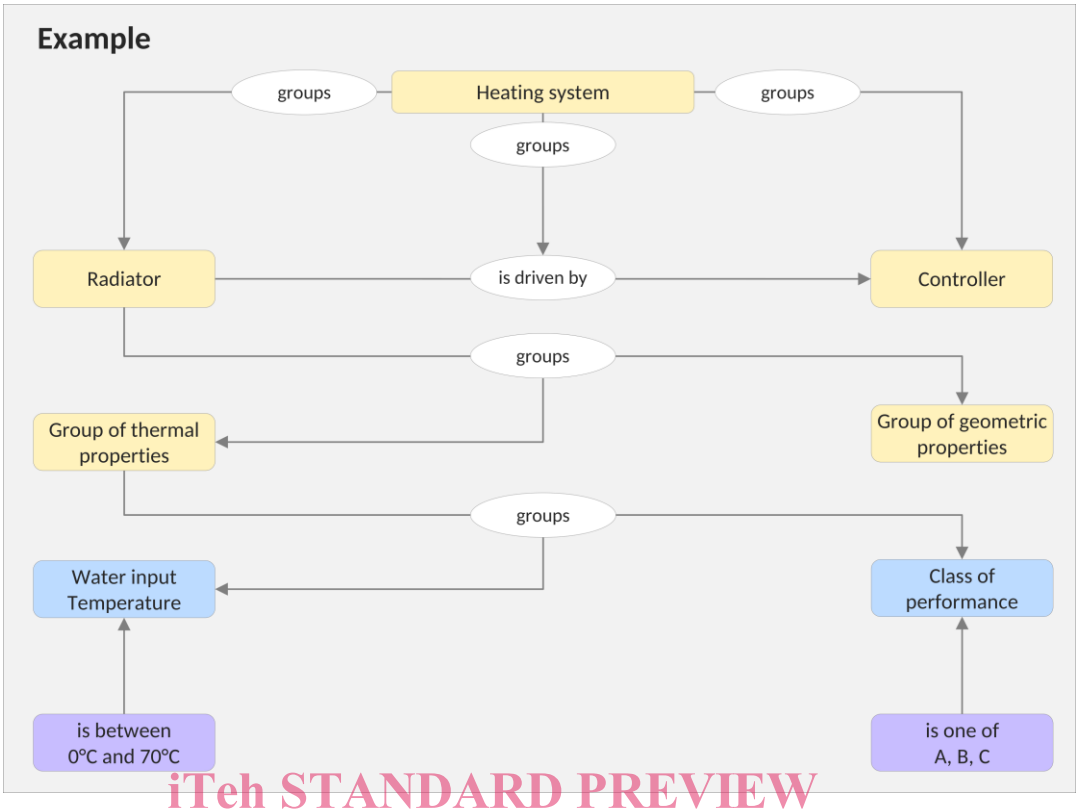


Figure 4 — Simplified example of a system

This example is modelled in Figure 5 in a data dictionary according to EN ISO 12006-3 (currently under revision). The heating system and its components are represented by entities of type *xtdSubject* which are connected by relationship entities of type *xtdRelationshipToSubjects*. The boxes with an italic text represent the attributes of the elements that implement these connections. The connection of the radiator to the controller is realized by a semantic relationship, which is related to a relationship object defining what "is driven by" means and defines the context in which this relationship is valid. The property groups are also represented by *xtdSubject* entities, and they are also connected by relationship entities of type *xtdRelationshipToSubjects*. The properties are finally linked to their property group.