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Library objects for architecture, engineering, construction, and use

Objets de bibliothèque pour l'architecture, l'ingénierie, la construction et l'utilisation

FDIS stage

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Foreword

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This document was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 8, *Construction documentation*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 442, *Building Information Modelling (BIM)*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

0.1 General

This document describes best practice for the development and application of library objects to support building information modelling (BIM)-based design, specification, construction and operational processes, including giving additional recommendations for specific use cases such as assemblies.

A library object is intended for reuse within project teams and across organizations. This serves to improve accuracy and constructability of designs and to improve the handover of information through the supply chain to the owner or operator. Objects in a digital format combining properties, shape and graphical symbols offer scope for greater accuracy and efficiency.

~~The objective has been to include~~This document includes principles and definitions for the symbolic and simplified visual presentation of library objects in connection with BIM and their organization into libraries.

0.2 Purpose and justification

The purpose of this document is to offer a standard for developers, library providers, designers and manufacturers to improve the exchange and reuse of library objects.

Library objects and their corresponding graphical symbols are now commonly provided in a digital format by model authoring software. Traditional paper-based methods for graphical symbols have therefore become less useful and are in some cases outdated. Several national standards have been withdrawn due to lack of maintenance and conflicting International Standards. Still, documentation of complex entities such as buildings and civil engineering works requires clear and uniform presentation so as to be legible and easily understood. This document is intended to give a framework for the presentation of library objects, with respect to those purposes, and also the structuring of graphical symbols into libraries.

Library objects, by combining properties, shape and graphical symbols, offer scope for greater accuracy and efficiency. Current technology gives the opportunity to adjust the views of library objects (content and visual presentation) to the many purposes that occur during the life cycle of a building information model and to connect symbol graphics to library objects.

0.3 Relationship to other standards

The increased adoption of data dictionaries, along with ~~the standards~~ ISO 23386 and ISO 23387, is expected to facilitate the preparation of data templates with properties for the non-graphical aspects of library objects and ISO 7817 to facilitate specifying the level of information need for geometrical and alphanumerical information and documentation.

The ISO 7817 concepts and principles can be applied for a general information exchange and, while in progress, for a generally agreed way of information exchange between parties in a collaborative work process, as well as for an appointment with specified information delivery. Therefore, ISO 7817 concepts and principles support the preparation of libraries outside of any individual project and are applied in this document.

This document recommends that ISO 16739-1 is used as a basis for the naming of objects.

Project and asset information references provided by the appointing party, such as object libraries, are covered in ISO 19650-2:2018, 5.1.6, and ISO 19650-3:2020, 5.1.8.

Guidance on graphical presentation for specific types of construction objects is provided by ISO 7519.

Library objects for architecture, engineering, construction and use

1 Scope

This document specifies requirements for defining structure and content for library objects to support project inception, brief, design, tendering, construction, operations, use and demolition, supporting the development of information throughout the process, in connection with building information modelling (BIM) and the organization of the objects into libraries.

This document does the following:

— Establishes requirements for defining template objects, generic objects and product objects in data-driven library and design processes.

— Establishes requirements for graphical symbols and other graphic conventions for use on drawings for the built environment, giving principles and definitions for the symbolic and simplified visual presentation of objects. It also describes a rationale of symbolism which establishes rules for the design of graphical symbols and other graphic conventions and gives recommendations for the application of those rules and the ways in which symbolism should be used.

— Defines the purposes of characterizing the shape and measurement of library objects.

— Defines the purposes of specifying and assessing properties for library objects. It defines the information appropriate for specific uses, including specification of the desired outcome (typically by designers and engineers) and the selection of identified products (typically by contractors and subcontractors). It also gives recommendations for the application of assemblies in integrated BIM working.

— Refers to the Industry Foundation Classes (IFC) schema as a common object model.

This document is ~~intended for~~applicable to all professionals and service providers who produce and use library objects with generic and product-specific information. This group includes, but is not limited to, product manufacturers and suppliers, library authors, designers and engineers, contractors, owners, maintainers~~,~~ and commissioners.

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.

ISO 13567-1, *Technical product documentation — Organization and naming of layers for CAD — Part 1: Overview and principles*

ISO 13567-2, *Technical product documentation — Organization and naming of layers for CAD — Part 2: Concepts, format and codes used in construction documentation*

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

ISO 23386, *Building information modelling and other digital processes used in construction — Methodology to describe, author and maintain properties in interconnected data dictionaries*

ISO 23387, *Building information modelling (BIM) — Data templates for construction objects used in the life cycle of built assets — Concepts and principles*

ISO 80000-1, *Quantities and units — Part 1: General*

3 Terms and definitions

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

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

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

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

3.1
library object
type object
representation of an object, being maintained as part of a collection with common features

Note 1 to entry: A library object can be a *template object* (3.2), *generic object* (3.3) or *product object* (3.4).

Note 2 to entry: A library object is independent of any occurrence and has no placement in space.

Note 3 to entry: A library object can be referred to as a type object or class.

Note 4 to entry: See Figure 1.

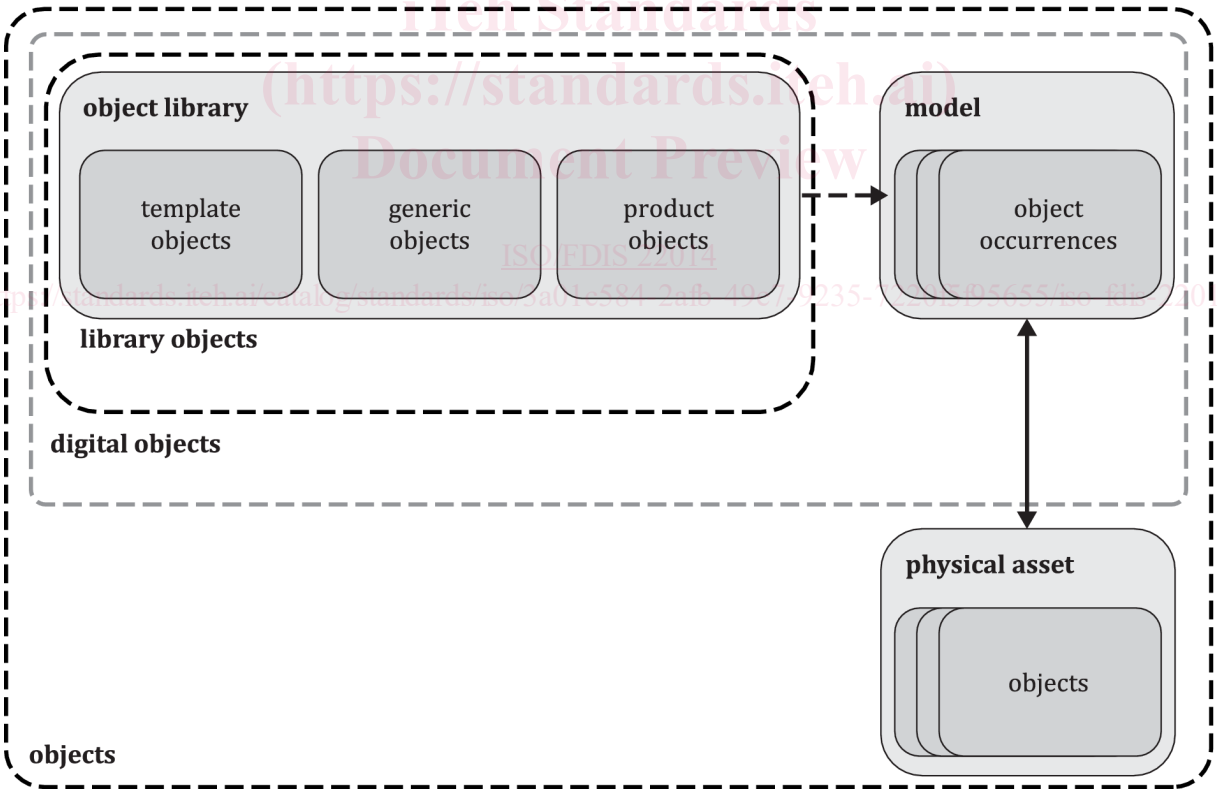

Figure 1 — Relationship between library objects

3.2
template object
library object (3.1) used as a guide to produce *generic objects* (3.3~~(3.1.2)~~) and *product objects* (3.4~~(3.1.3)~~)

Note 1 to entry: A template object typically provides schedules of classification values and a minimum set of properties. The measurement type (e.g. “area”) of properties (e.g. “Effective Area”) are specified, but the values and units (e.g. “0,300” and “m²”) are not.

Note 2 to entry: Data templates containing recommended properties and set(s) of properties can be available to support the development of template objects.

3.3
generic object
library object (3.1) used as a generalization

Note 1 to entry: A generic object is intended for use prior to being resolved into a *product* (3.5).

Note 2 to entry: Typically, shape and *graphical symbols* (3.6) will be provided and some property values with units.

3.4
product object
library object (3.1) used to represent a *product* (3.5)

Note 1 to entry: A product object is specific to a manufacturer and model identity.

3.5
product
item manufactured or processed for incorporation into construction works

[SOURCE: ISO 6707-3:2022, 3.3.1, modified — Admitted term “construction product” deleted. Note 1 to entry deleted.]

3.6
graphical symbol
visually perceptible figure with a particular meaning used to transmit information independently of language

Note 1 to entry: The graphical symbol may represent objects of interest, such as *products* (3.5), functions or requirements for manufacturing, quality control, etc.

Note 2 to entry: A graphical symbol is not to be confused with the *simplified representation* (3.10) of products which is normally drawn to scale and which can look like a graphical symbol.

Note 3 to entry: Typically, a graphical symbol is a graphic entity independent of scale, used:

a) on a drawing to indicate the occurrence and/or location of a *library object* (3.1);

b) in an annotation to indicate one or more of the *properties* (3.9) of a library object.

[SOURCE: ISO 81714-1:2010, 3.1, modified — Note 3 to entry added.]

3.7
graphical symbol element
part of a *graphical symbol* (3.6) with a particular meaning

[SOURCE: ISO 22727:2007, 3.5]

3.8
assembly
set of related types or components attached to each other

Note 1 to entry: Typically, an assembly is a partial model where both the overall assembly and the constituent parts are managed during design, construction or use, and the constituent parts are located relative to the overall assembly.

[SOURCE: ISO 6707-1:2020, 3.3.5.5, modified — "types or" and Note 1 to entry added.]

3.9
property
data element for the computer-sensible description of a property, a relation or a class

~~[SOURCE: ISO 22274:2013, 3.25, modified — definition revised and example removed.]~~

3.10
simplified representation
representation drawn in accordance with the valid rules of projection and on which individual elements of the *product* (3.5) are not shown, provided this does not present difficulties in understanding the drawing

[SOURCE: ISO/TS 128-71:2010, 3.2]

4 Applications

4.1 General

Library objects shall support the entire life cycle of the digital representation of the built assets, including buildings and infrastructure.

Use of consistent template, generic and product objects can add efficiency and reduce risks associated with information loss or misinterpretation. See Figure 2 for an example upgrade process.

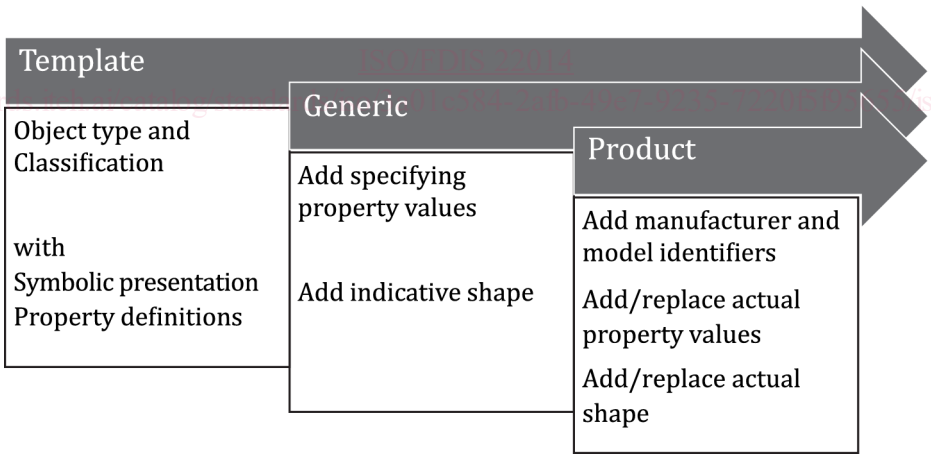

Figure 2 — Example of upgrading a library object

4.2 Template objects

Template objects shall be:

— created and shared, to guide library developers;

— used to illustrate best practice, define expectations for completeness and test generic and product library objects.

Template objects provide guidance for developers of generic objects and product objects and should contain only identification information and, wherever possible, properties without value. Shape and symbolic presentations are optional. Priority should be given to template objects created by international and regional bodies, professional and trade associations, and other consensus-based bodies, in particular those which conform to ISO 23386, ISO 23387 and ISO 12006-3.

4.3 Generic objects

Generic objects shall be:

— based on published template objects, where available;

— created and shared, for example, by application vendors and in-house application support teams;

— used from the earlier stages of design and specification;

— used to answer the level of information need of each information deliverable according to its purpose;

— replaced with or upgraded to product objects when decided.

NOTE Generic objects support initial design and engineering and so contain at least identification and specifying information to support the later selection of product library objects.

4.4 Product objects

4.4.1 General

Product objects shall be:

— based on published generic objects, where available;

— created and shared by manufacturers and third parties;

— used to validate design intent;

— used as the basis for quantification and procurement;

— used to document as-installed information to support operations, maintenance and replacement;

— used to answer the level of information need of each information deliverable according to its purpose:

— able to support economic, functional and environmental assessments.

NOTE 1 Product objects support the remaining stages of the project and built asset life cycle by representing procured products and materials.

NOTE 2 Data templates for environmental product declarations are specified in ISO 22057.

4.4.2 Catalogue product objects

Catalogue product objects, representing a specific product with fixed properties available from a catalogue, shall be designed to be:

— accessed and used directly by applications;

— associated to unique product identifiers.

NOTE Catalogue product objects represent off-the-shelf products and commodity materials.

4.4.3 Parametric series product objects

Parametric series product objects, representing a controlled range or series of generic or product objects with variable properties, shall be designed to be:

— accessed and configured to suit the level of information need of each information deliverable according to its purpose during the entire life cycle;

— associated to unique series identifiers.

NOTE Parametric series product objects represent configurable variants defined in standards and manufacturers' catalogues.

4.4.4 Engineered-to-order product objects

Engineered-to-order product objects, representing a specific product, either as a requirement specification or a resolved solution that can be manufactured, shall be designed to be:

— accessed and configured to document the level of information need of each information deliverable according to its purpose during the entire life cycle;

— used as the basis for requests for engineered solutions from suppliers and manufacturers;

— upgraded to engineered solutions supplied by a supplier or manufacturer.

NOTE Engineered-to-order product objects represent specified configurations, which are then substituted by specific solutions provided by a manufacturer.

5 Principles

Library objects shall support the following purposes:

— identification of the product, its physical and virtual source, its classification and type (see Clauses 4 and 6) and its representation in schedules and quantity take-offs;

— use in the production of conventional drawings and projections (see Clause 7);

— use in 3D projections, spatial coordination or clash detection, use simulation and visualizations, quantity take-off (see Clause 8);

— use in specification, estimating and functional, environmental and economic analysis (see Clause 9);

— use in assemblies, where relevant (see Clause 10).

The information provided shall be of sufficient quality for these purposes; it shall be consistent and non-conflicting, and minimal but sufficient for the anticipated purposes. The library object, its graphical symbols, shape and properties shall be associated to a consistent system of units of measure.

Where applicable, library objects shall correspond to real-world objects containing the information known and considered relevant at the current stage and purposes of the process. The amount of information will increase during the life-cycle stages. Predefined levels of detail, measurement and properties shall be considered so as to specify the relevance of the supplied information with respect to its purpose within a specific period of its life cycle.

As far as possible, library objects should be created independent of the project stage or specific purposes, other than the generic to product upgrade process which can occur at any project stage.