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Technical product documentation (TPD) — Construction documentation — Drawings for the assembly of prefabricated structures

Documentation technique de produits (DTP) — Documentation de construction — Dessins d'assemblage des structures préfabriquées

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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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/SS F01, *Technical drawings*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 4172:1991), which has been technically revised.

The main changes are as follows:

— update of normative references;

— provision of wider levels of drawings;

— replacement of the term “location drawings” by “general arrangement drawings”.

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

This document sets out the requirements for representing prefabricated structures with assembly drawings. Prefabricated structures are components that are more likely to be considered as products comprising assemblies, rather than traditional components.

The purpose of this document is to aid with the following aspects:

— defining the drawing types and their hierarchy clearly;

— providing the technical rules within each type of drawing;

— giving guidelines for the application of representation techniques.

Those who draw prefabricated structures are encouraged to think about the methods they use to collect, demonstrate and disseminate product information to all stakeholders, including designers, engineers, manufacturers and contractors. Product information supports stakeholders to recognize product definitions, relations and other requirements identified within the life cycle. It is recognized that the drawing of products, using common lines, symbols and other graphic representations, aids in the organization of the information on the basis of concepts and relationships. Therefore, this document is intended to be adopted in coordination with ISO 7519 and other applicable standards.

ISO 7519 provides a method for organizing presentation approaches for a building, system, assembly, component or part, therefore providing comprehensive information hierarchically. Such a delivery method is advanced to regularize the flow of information within the supply chain. It does this by specifying a clear scope for requirements or specific objects using building information modelling (BIM) or other computer-aided design and drafting (CAD) applications, thereby enhancing the effectiveness of the processes involved by presenting unambiguous and sufficient data.

This document establishes the rules for prefabricated structures following the principles in ISO 7519 while maintaining symbolic representation applicable in the built environment sector. International Standards relating to technical product documentation developed by ISO/TC 10, as well as BIM International Standards developed by ISO/TC 59/SC 13, are considered helpful in adopting this document.

The figures included in this document are intended to illustrate the text and provide examples of the related technical drawing specification. These figures are not fully dimensioned and toleranced, showing only the relevant general principles. In all figures, the leader lines using an arrow and text ending with “type” and numbers indicate the line types used for the representations. They are not elements that are presented in a construction drawing.

Technical product documentation (TPD) — Construction documentation — Drawings for the assembly of prefabricated structures

1 Scope

This document specifies general requirements for the preparation of construction drawings intended for the field assembly of prefabricated structures for building and civil engineering works.

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 129-1, *Technical product documentation (TPD) — Presentation of dimensions and tolerances — Part 1: General principles*

ISO 4157-1, *Construction drawings — Designation systems — Part 1: Buildings and parts of buildings*

ISO 6284, *Technical product documentation — Construction documentation — Indication of limit deviations*

ISO 6707-1, *Buildings and civil engineering works — Vocabulary — Part 1: General terms*

ISO 7200, *Technical product documentation — Data fields in title blocks and document headers*

ISO 7519, *Technical product documentation (TPD) — Construction documentation — General principles of presentation for general arrangement and assembly drawings*

ISO 7573, *Technical product documentation — Parts lists*

ISO 10209, *Technical product documentation — Vocabulary — Terms relating to technical drawings, product definition and related documentation*

ISO 14405 (all parts), *Geometrical product specifications (GPS) — Dimensional tolerancing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1 and ISO 10209 and the following 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
assembly
set of related components attached to each other

Note 1 to entry: An assembly can be an aggregation which performs a systematic function, e.g. a structural frame, truss or modular container.

Note 2 to entry: An assembly can be a nested form, i.e. it can consist of sub-assemblies.

[SOURCE: ISO 6707-1:2020, 3.3.5.5, modified — Notes 1 and 2 to entry added.]

3.2
prefabricated structure
structure consisting of prefabricated *structural members* (3.3)

3.3
structural member
part of a structure intended to resist forces

Note 1 to entry: In this document, a structural member is commonly a component, sometimes an assembly, such as a modular unit or an assembled truss, which is delivered to the construction site as a purpose part.

[SOURCE: ISO 6707-1:2020, 3.3.1.3, modified — Note 1 to entry added.]

4 Documentation

4.1 General

4.1.1 Types of drawings and documents

The documentation for prefabricated structures shall comprise the following documents:

— general arrangement drawings;

— assembly drawings (as required);

— component drawings;

— detail drawings;

— either component schedules or a parts list or both;

— specifications.

Structural members and other relevant objects represented on each type of drawing shall be appropriately detailed to clearly communicate design information in accordance with ISO 7519.

4.1.2 Application of lines

The application of lines for the designated components shall be as follows:

— continuous extra-wide lines (type 01.3) indicating outlines in the cutting plane (see Figures 1, 2 and 3);

— continuous wide lines (type 01.2) indicating edges for visible linear components and dashed wide lines (type 02.2) for hidden components (see Figures 1 and 2);

— continuous wide lines (type 01.2) indicating edges for visible panels, slabs or blocks and dashed wide lines (type 02.2) for hidden components (see Figures 3 and 4);

— in cases where all linear components are represented with single lines, as extremely simplified presentations, continuous extra-wide lines (type 01.3) indicating axial lines for visible linear components and dashed extra-wide lines (type 02.3) for hidden components (see Figures 2 and 5).

NOTE 1 In this document, the line type numbers are given in accordance with ISO 128-2.

The reference grid shall be drawn with grid lines and the modular grid shall be drawn with modular lines (see ISO 8560). The application of lines shall be as follows:

— continuous narrow lines (type 01.1) for modular lines for the first stage, and continuous wide lines (type 01.2) for the second stage;

— long-dashed dotted narrow lines (type 04.1) for grid lines or modular lines in an axial position (see Figures 1 and 8).

Leader lines and reference lines shall be executed as a continuous narrow line (type 01.1) (see Figure 8).

NOTE 2 See ISO 128-2 for more information about the basic conventions and applications for leader lines and reference lines.

4.1.3 Presentation of dimensions

The general principles for presentation of dimensions shall be in accordance with ISO 1291.

4.1.4 Indications of tolerances and limit deviations

Dimensional tolerances shall be in accordance with the ISO 14405 series.

Indications of limit deviations shall be in accordance with ISO 6284 when presenting the following information:

— allowable manufacture tolerance;

— allowable construction tolerance.

4.1.5 Instructional information

Instructional information for the assembling process, including design charts or loading schemes, may be given in the space for text on drawings defined by ISO 9431.

The design charts or loading schemes can indicate loading limitations, erection procedures and other details concerning erection.

4.2 General arrangement drawings

4.2.1 General

A general arrangement drawing shall be a simplified representation of a prefabricated structure and the location of designated structural members.

4.2.2 Presentation

The general arrangement drawing(s) should present prefabricated structural members by showing the following:

— reference grid or modular grid relating to the construction works;

— structural members and their designations;

— relationship of structural members to the reference grid, modular grid or coordinates of key points;

— specific levels of structural members;

— reference to other drawing types.

NOTE 1 The key points can be either the vertexes on an outer corner, the midpoint on an edge or the centroid of a shape, whichever is more likely to be the best point for location. Best practice dictates that the same type components are designated the same key points.

The designated components shall be represented symbolically or by their simplified low-detail representations, as illustrated in Figures 1 to 6.

For each group of components for prefabricated structures connected by similar construction conditions, the general arrangement drawings should indicate the sequence of their application during assembly.

NOTE 2 See ISO 7519 for details of simplified representation and other techniques used here and in the rest of this document.

4.2.3 Views and scales

The prefabricated structural members should be shown in a sufficient number of different views to effectively communicate the design information. Views should be in accordance with ISO 128-3.

The preferred scales for the general arrangement drawings are 1:50, 1:100 and 1:200.

4.2.4 Indication of designations

Each component shall be marked with a designation code in accordance with Clause 5 to indicate it is a prefabricated component.

4.2.5 Presentation of underground structures

The following should be shown on the general arrangement drawings of prefabricated foundations and other underground structures:

— outline of foundation beds (type 01.2), foundation sublayers (type 02.2), foundation beams (type 01.3 or 01.2 for outlines), basement walls (type 01.3 and shading or hatching is required);

— their sizes;

— their relationship to reference grids or coordinates.

General arrangement drawings for foundation and other underground structures shall be represented on the assumption that the ground is transparent.

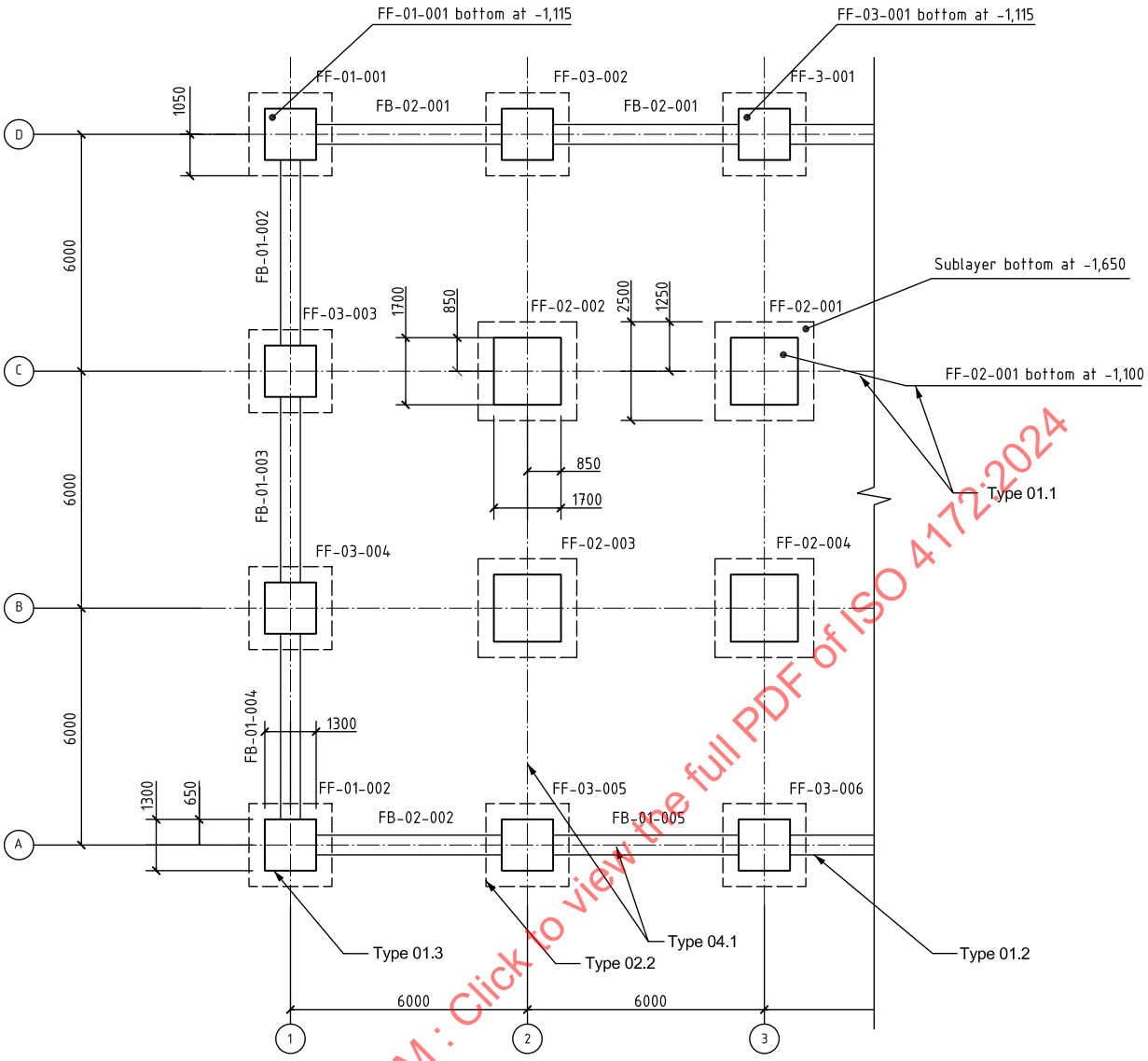

Figure 1 — Example of a general arrangement drawing in which components are indicated with outlines

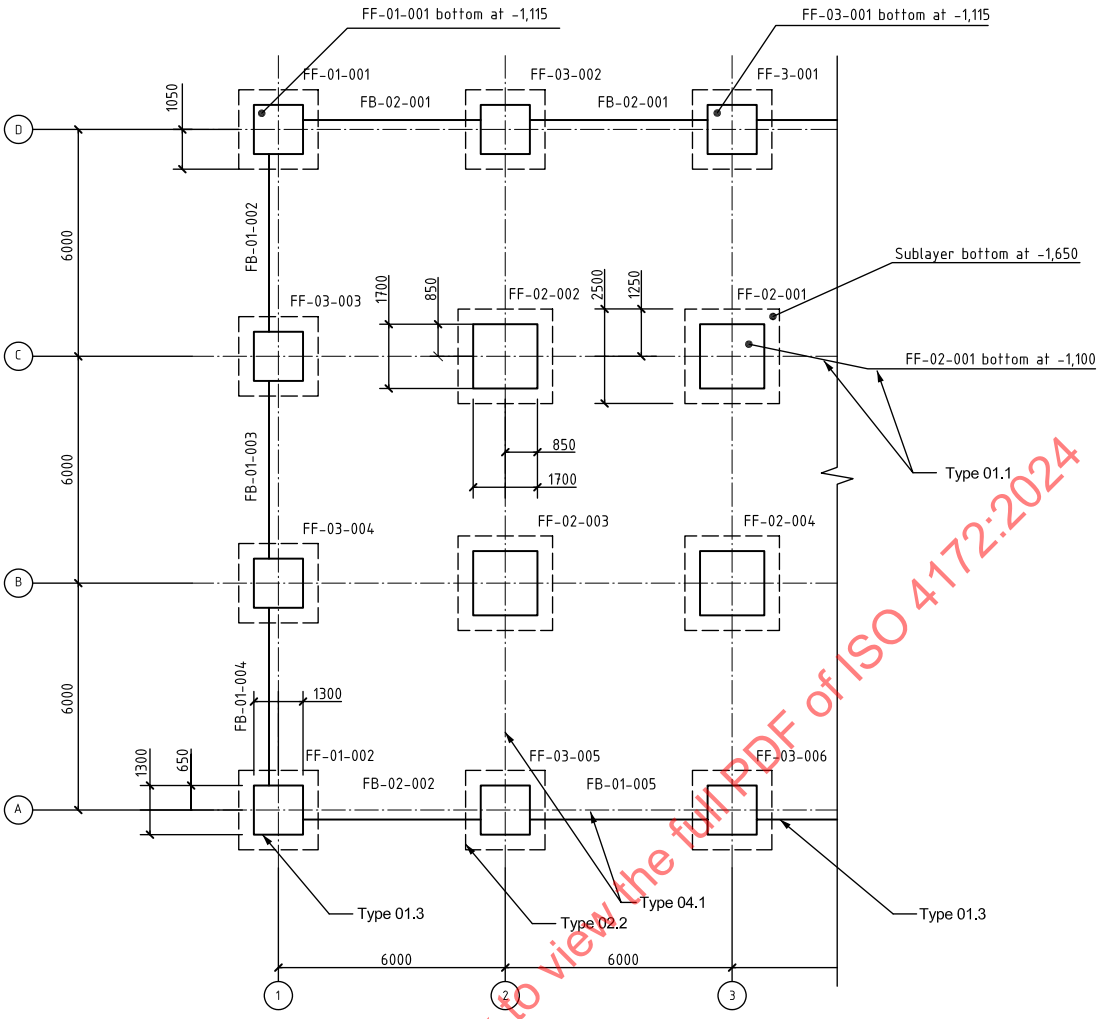

Figure 2 — Example of a general arrangement drawing in which beams are indicated with single lines

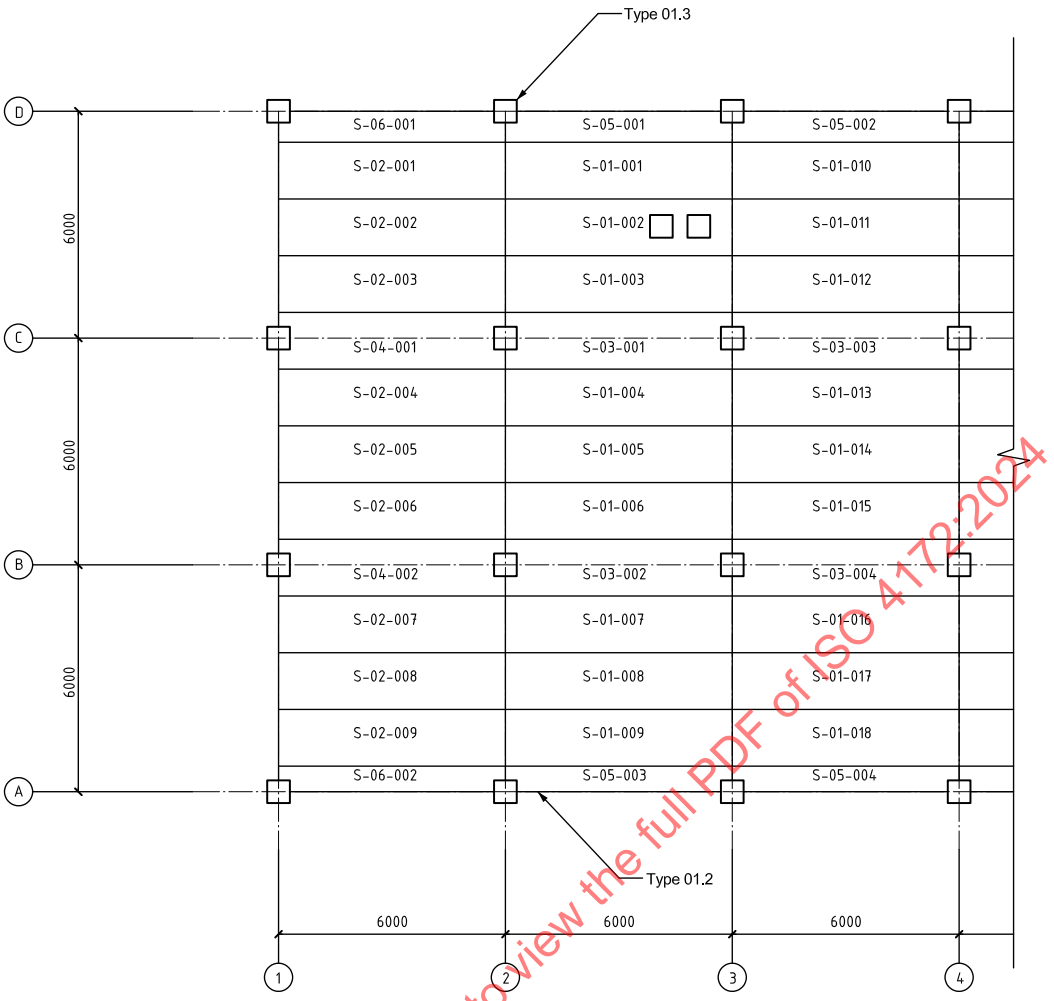

Figure 3 — Example of a general arrangement drawing in which slabs are indicated with outlines

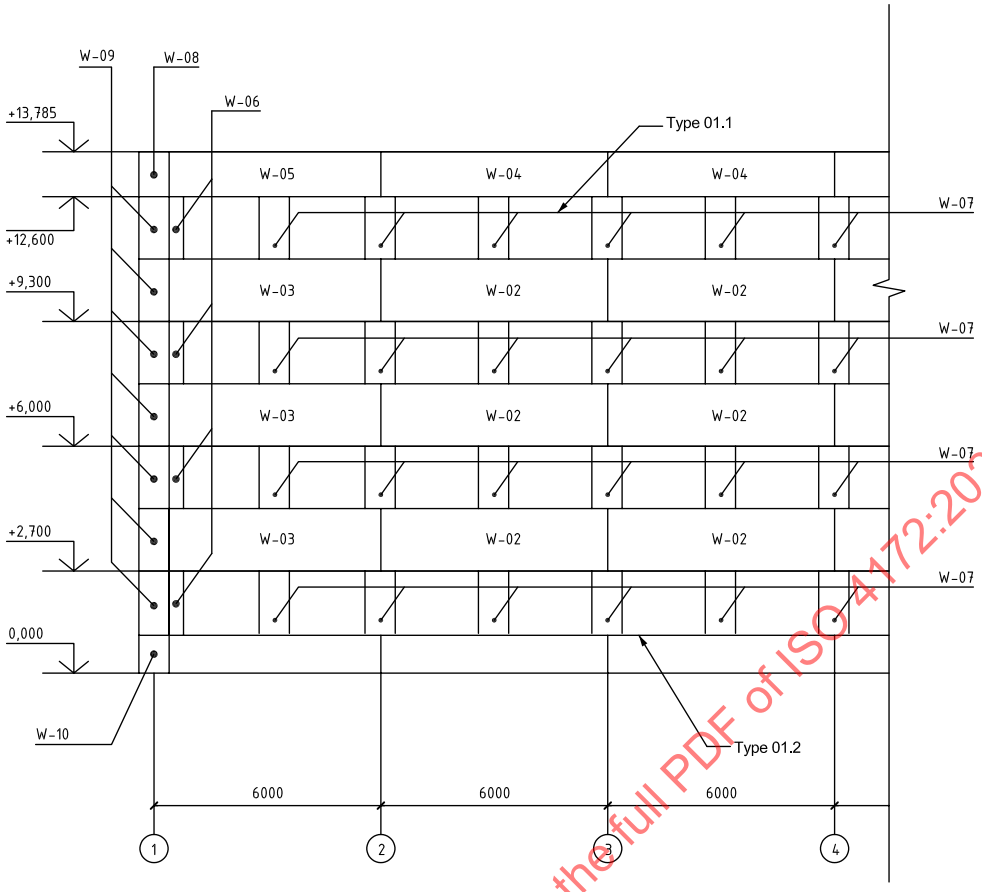

Figure 4 — Example of a general arrangement drawing in which panels are indicated in elevation view

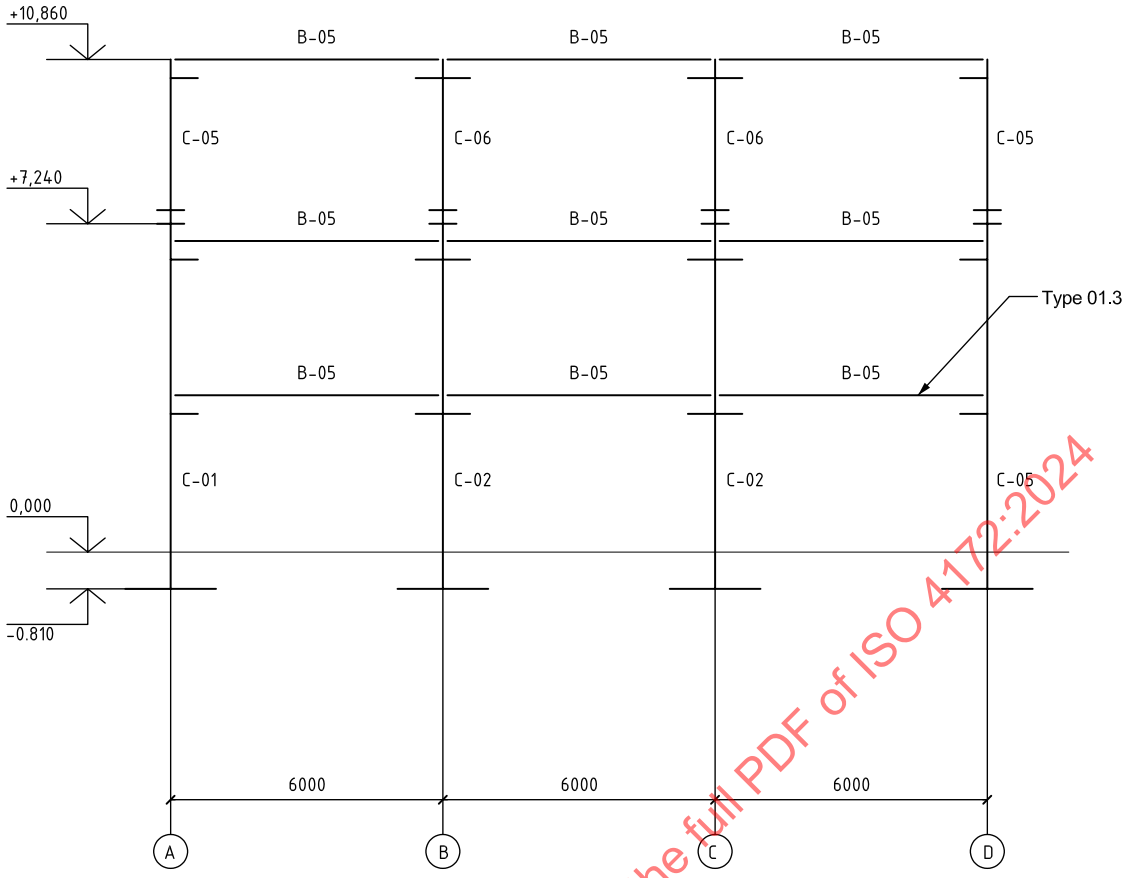

Figure 5 — Example of a general arrangement drawing in which a structural frame is indicated in section view

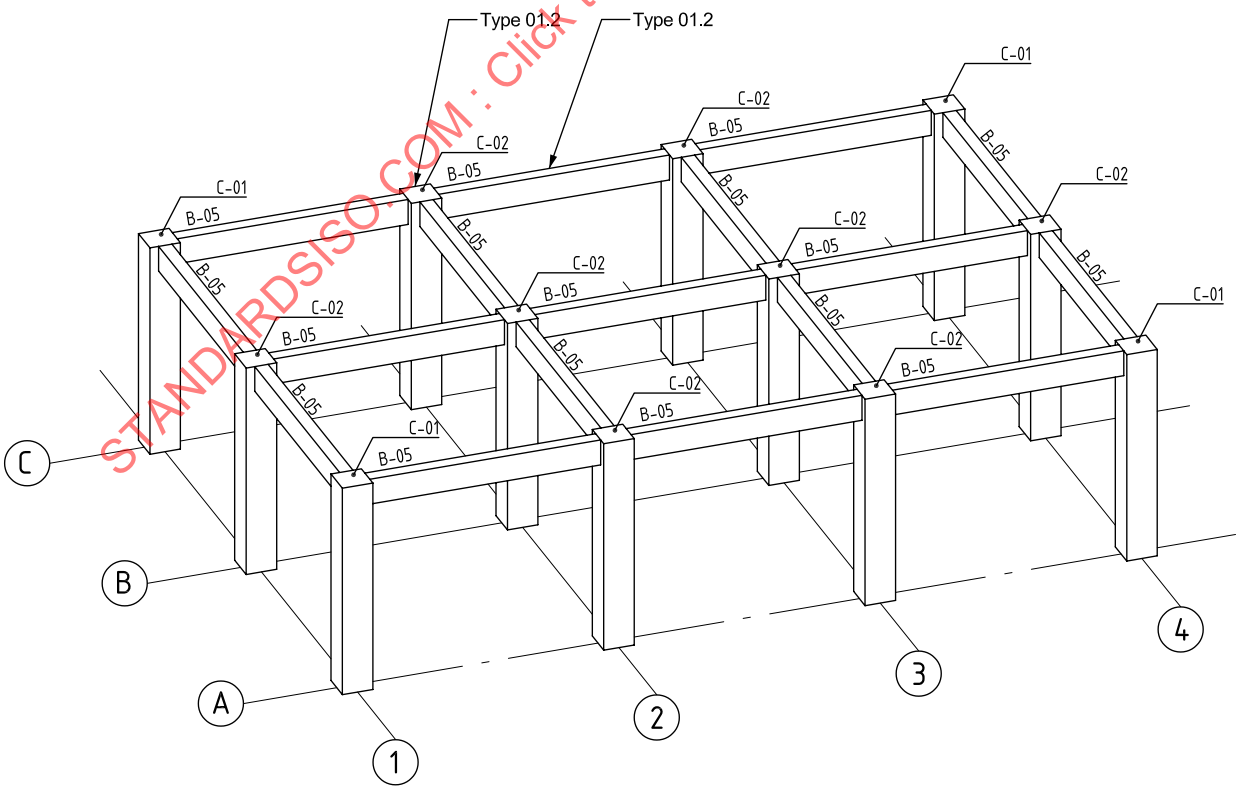

Figure 6 — Example of a general arrangement drawing in which a structural frame is indicated in an axonometric representation

4.3 Assembly drawings

4.3.1 General

Assembly drawing(s) shall show an assembly which contains one or more prefabricated components and the connections between them.

Assembly drawings are not required if the design information can be conveyed unambiguously by the method that the component drawings are referenced directly from the general arrangement drawing(s).

NOTE Assembly drawings can show more detail than general arrangement drawings, with larger-scale views and a smaller scope. They are appropriate for complicated buildings and help to deliver building information clearly.

4.3.2 Presentation

Assembly drawing(s) should present an assembly by showing the following:

— reference grid lines or modular lines relating to the assembly;

— structural components and their designations;

— the relationship of components to the reference grid lines, modular lines or coordinates of key points;

— specific levels of structural components;

— references to other drawing types.

The designated component shall be represented by its simplified low- or medium-detail representation, as illustrated in Figure 7.

NOTE Simplified levels of representation are specified in ISO 7519.

When the location of a component is indicated by property items in the schedules, the coordinates of key points on the component should be presented on the assembly drawings. To choose the appropriate key points, the following aspects can be considered:

— easy to be marked on site;

— conspicuous to viewers;

— convenient to users during erection process.

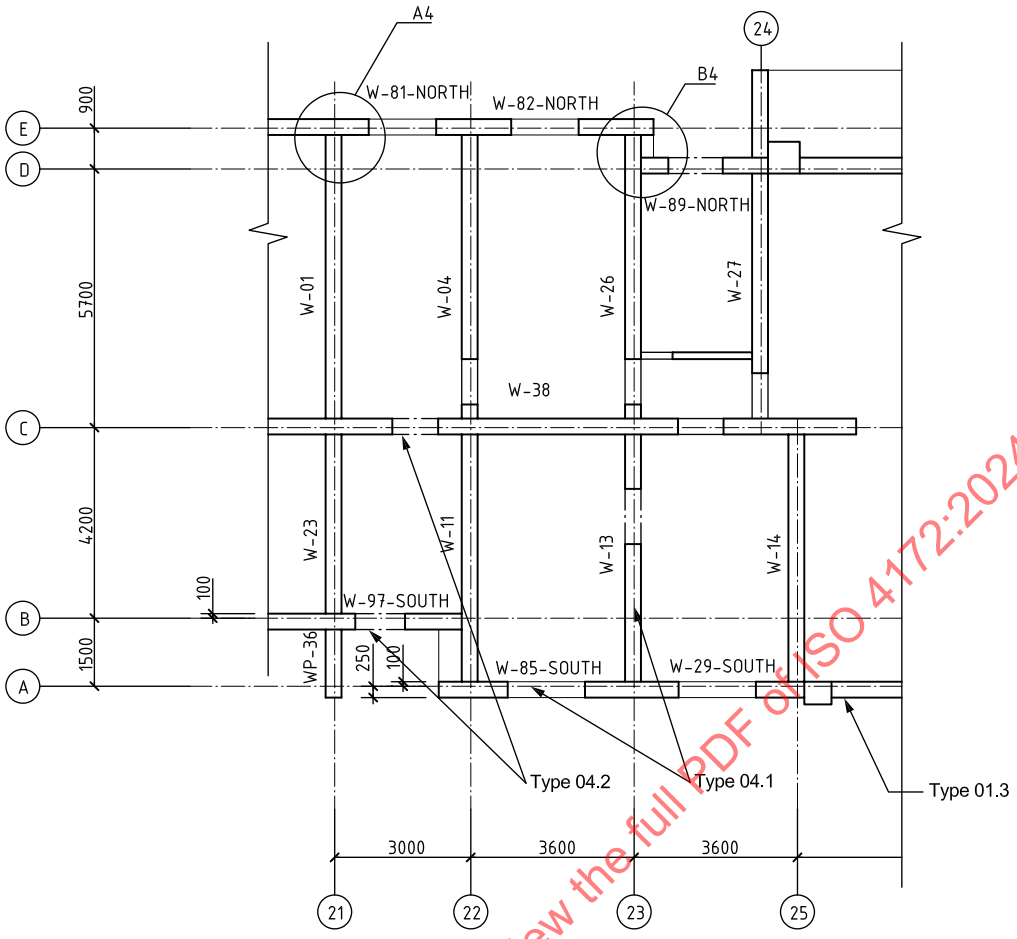

Figure 7 — Example of an assembly drawing in which a group of panels is indicated in plan view

4.3.3 Views and scales

The assembly should be shown in a sufficient number of different views to effectively communicate the design information. Views should be in accordance with ISO 128-3.

The preferred scales for the assembly drawings are 1:20 and 1:50.

4.3.4 Indication of designations

Each component within the assembly drawings shall be denoted with a designation code in accordance with Clause 5.

4.4 Component drawings

4.4.1 General

Component drawings shall indicate whether a component is a standardized product and/or part of a standardized structural system, or a proposed bespoke element.

Components that are identical shall be presented in the same set of drawings.

4.4.2 Presentation

The component drawing(s) should present a component by showing the following:

— reference grid lines or modular lines relating to the component (as required);

— geometrical representations of the component and all its constituent parts;

— indications of target sizes with the necessary tolerances;

— key notes on materials;

— notes about criteria for materials, performance metrics (as required);

— notes about shipping, erection, assembling and other requirements or instructions (as required).

The component shall be represented by its simplified medium- or high-detail representation.

The notes about criteria for materials and performance metrics and the notes about shipping, erection, assembling and other requirements or instructions can be stated in the specifications. In this case, the component drawing(s) shall provide symbols of reference linking to specification document(s).

4.4.3 Views and scales

The components should be shown in a sufficient number of different views to effectively communicate the design information. Views should be in accordance with ISO 128-3.

The preferred scales for component drawings are 1:10 and 1:20.

4.4.4 Indication of designation codes

The designation codes (see Clause 5) shall be indicated in the component drawing title, and the running number may be omitted if it does not cause any ambiguity.

4.5 Detail drawings

4.5.1 General

A detail drawing in the context of this document shall be used to clarify further information presented on general arrangement drawings and assembly drawings, specifying in more detail how components are to be arranged and put together.

Details may be shown on separate drawings or may be included as additional information on the general arrangement drawings or assembly drawings, if the required space exists.

Details shall be properly annotated on the relevant drawings.

4.5.2 Presentation

Representations of joints are the main part of the detail drawing.

A representation of joints shows the relationship between prefabricated structural components, where they come together, and shall show:

— reference grid lines or modular lines;

— joint dimensions, with an indication of the necessary tolerances;

— the designations of components shown on the other drawings and, if required, additional marks to identify the surfaces that are to come together at the joint;

— methods of connection, for example welding or bolted connections, or the use of continuity reinforcement, in conjunction with site-poured concrete;

— built-in parts and connection details, including the products to be used.

Two joints, where one represents a mirror image of the other, shall be shown as two independent joints and have independent designations.

If it is necessary to differentiate between the graphical representation of joints required for erection and assembly and those representations that describe the finishing of the joint (e.g. corrosion protection, thermal movement), or between supporting joints, sealing joints and open joints, this shall be done by using separate designations or symbols that are explained in the drawing.

Where necessary, the graphical representation of joints should be supplemented by text covering such matters as erection procedures, assembly and corrosion protection.

Examples of the graphical representation of joints are given in Figure 8 and Figure 9.

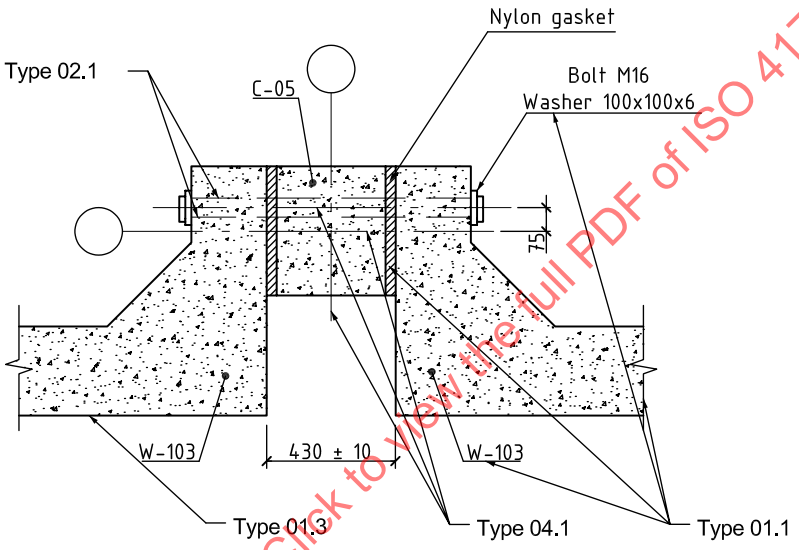

Figure 8 — Example of a detail drawing in which a joint is indicated in horizontal section

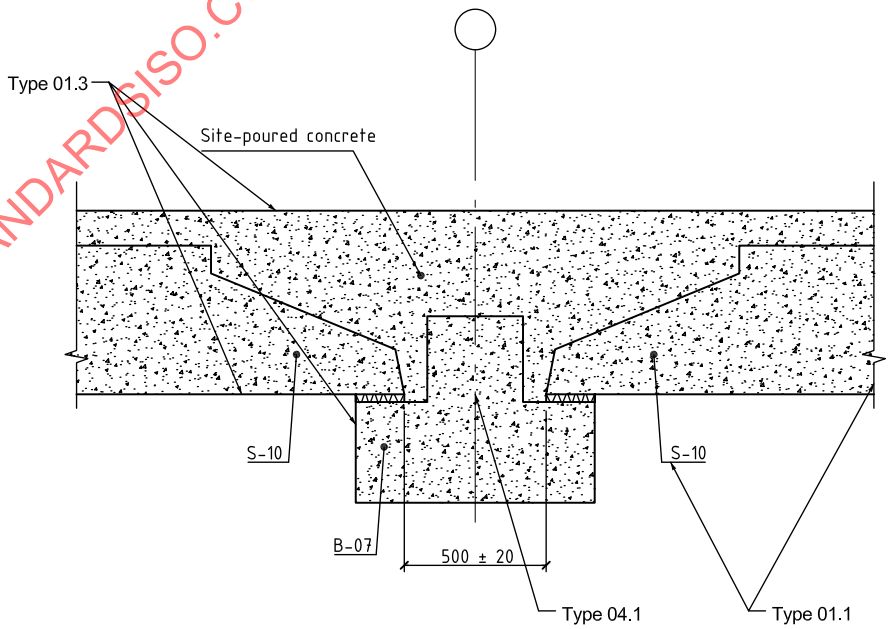

Figure 9 — Example of a detail drawing in which a joint is indicated in vertical section