
**Technical product documentation —
Simplified representation of
pipelines —**

**Part 2:
Isometric projection**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html

This document was prepared by Technical Committee ISO/TC 10, *Technical drawings*, Subcommittee SC 10, *Process plant documentation*.

This second edition cancels and replaces the first edition (ISO 6412-2:1989), which has been technically revised.

[ISO 6412-2:2017](http://www.iso.org/iso/foreword.html)

The main changes compared to the previous edition are as follows:

- the normative references were updated;
- the document underwent editorial revision.

A list of all parts in the ISO 6412 series can be found on the ISO website.

Introduction

For drawings for tender, manufacturing drawings and erection drawings in pipeline construction as well as in machine construction and the construction industry, isometric projection has been introduced to a great extent, since the drawing work can be cut down and the presentation made clearer.

For the purposes of this document, all dimensions and tolerances on the drawings have been stencilled in upright lettering. It should be understood that these indications could just as well be written in free-hand or inclined (italic) lettering without altering the meaning of the indications.

For the presentation of lettering (proportions and dimensions), see ISO 6412-1.

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Technical product documentation — Simplified representation of pipelines —

Part 2: Isometric projection

1 Scope

This document specifies supplementary rules, in addition to the general rules given in ISO 6412-1, applicable to isometric representation. Isometric representation is used where it is necessary to show the essential features clearly in three dimensions.

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 128-20, *Technical drawings — General principles of presentation*

ISO 129-1, *Technical drawings — Indication of dimensions and tolerances — Part 1: General principles*

ISO 3545-1, *Steel tubes and fittings — Symbols for use in specifications — Part 1: Tubes and tubular accessories with circular cross-section*

ISO 5261, *Technical drawings — Simplified representation of bars and profile sections*

ISO 6412-1, *Technical drawings — Simplified representation of pipelines — Part 1: General rules and orthogonal representation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6412-1 apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

4 Coordinates

As far as it is necessary to use Cartesian coordinates, for instance for calculations or numerical control of machine tools, the coordinate axes shall comply with [Figure 1](#).

In all cases, the coordinates of individual pipes or pipe assemblies shall comply with those adopted for the complete installation and shall be indicated on the drawing or in an associated document.

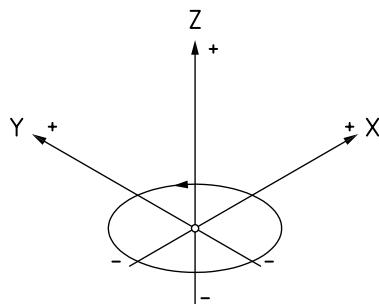


Figure 1

5 Line conventions

See ISO 6412-1:2017, 4.4.2.

6 Deviations from the direction of coordinate axes

6.1 General

Pipes, or parts of pipes, running parallel to the coordinate axes, shall be drawn parallel to the relevant axis without any further indication.

Deviations from the directions of the coordinate axes shall be indicated by means of auxiliary hatched projection planes as shown in [Figure 2](#).

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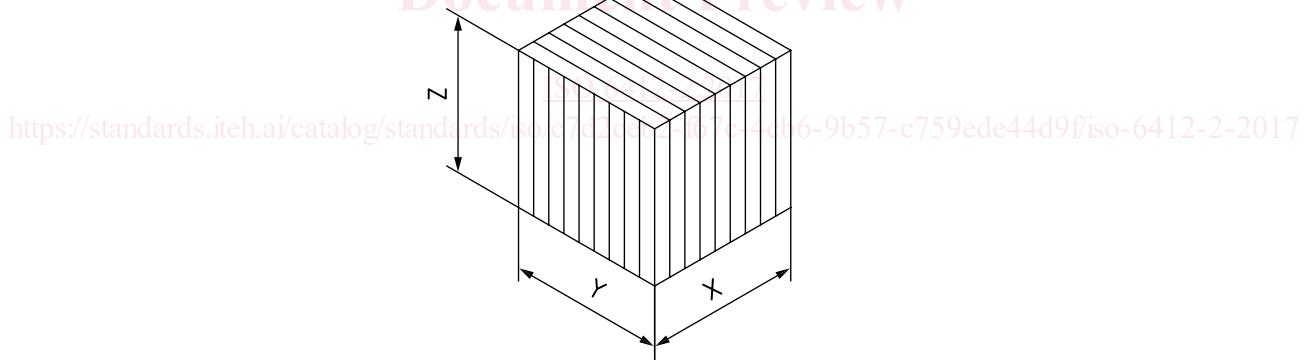


Figure 2

6.2 Pipes in a vertical plane

Pipes, or parts of pipes, situated in a vertical plane, shall be indicated by showing their projections on a horizontal plane [see [Figure 3 a\)](#)].

6.3 Pipes in a horizontal plane

Pipes, or parts of pipes, situated in a horizontal plane, shall be indicated by showing their projections on a vertical plane [see [Figure 3 b\)](#)].

6.4 Pipes not parallel to any coordinate plane

Pipes, or parts of pipes, not running parallel to any coordinate plane, shall be indicated by showing both their projections on a horizontal and on a vertical plane [see [Figure 3 c](#)].

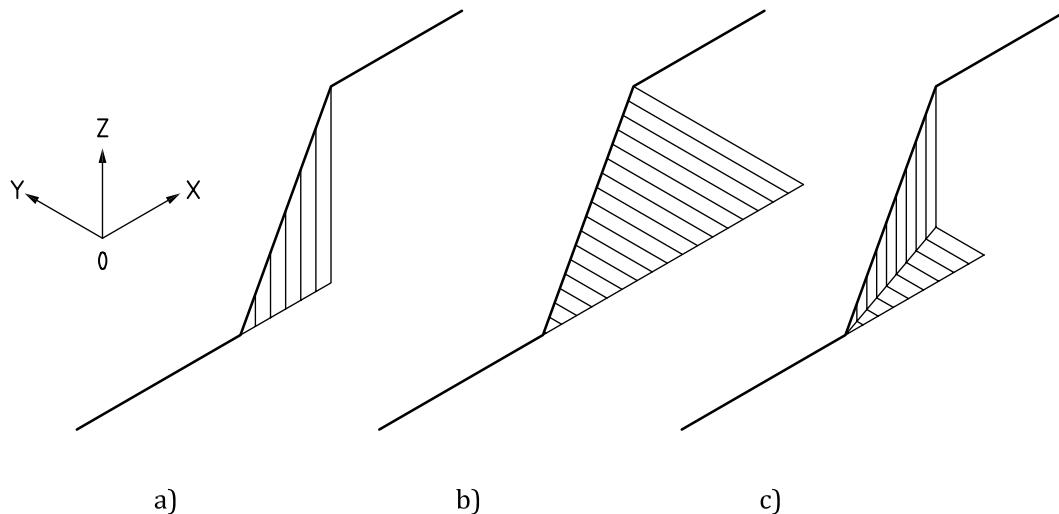


Figure 3

6.5 Auxiliary projection planes

It is recommended that the right angles of the triangles limiting the auxiliary projection planes be indicated.

Auxiliary projection planes may be emphasized by hatchings, parallel to the X- or Y-axis for horizontal auxiliary planes, and vertical for all other auxiliary planes.

If such hatching is not convenient it may be omitted, but in that case the rectangle (see Figure 4) or the rectangular prism (see Figure 5), of which a diagonal coincides with the pipe, shall be shown, using continuous narrow lines (type 01, ISO 128-20).

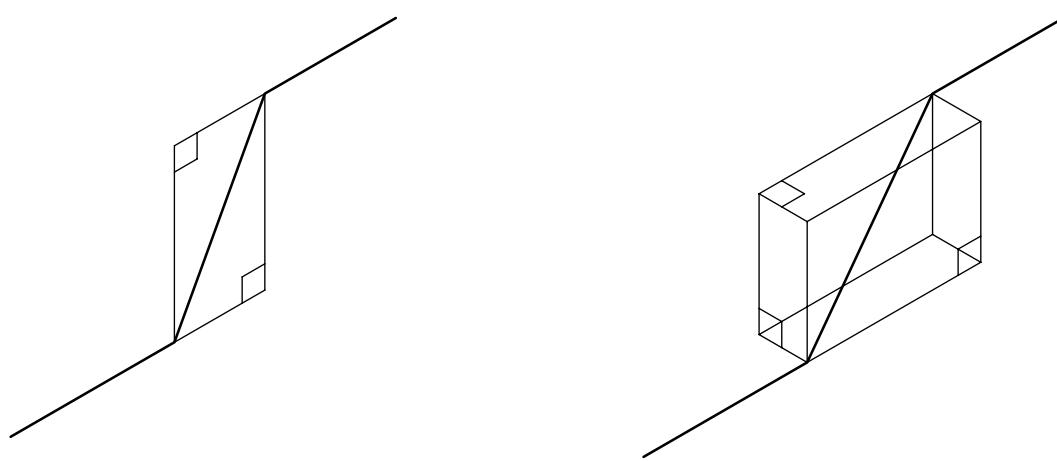


Figure 4

Figure 5

7 Dimensioning and special rules

7.1 General

Drawings shall be dimensioned in accordance with ISO 129-1. There are, however, special rules for isometric projection for pipelines which are specified in [7.2](#) to [7.10](#).

7.2 Diameters and wall thickness

The outer diameter (d) and the wall thickness (t) of pipes shall be indicated in accordance with ISO 5261 (see [Figure 6](#)). Nominal dimensions may be indicated in accordance with ISO 3545-1 using the short designation "DN" (see ISO 6412-1:2017, Figure 1).

7.3 Longitudinal and angular dimensions

Longitudinal and angular dimensions shall be indicated in accordance with ISO 129-1; the length shall start from the outer faces of the pipe ends, flanges, or centre of the joint, whenever appropriate.

7.4 Pipes with bends

Pipes with bends shall be dimensioned from central line to central line or from the central line to the end of the pipe (see [Figure 6](#)).

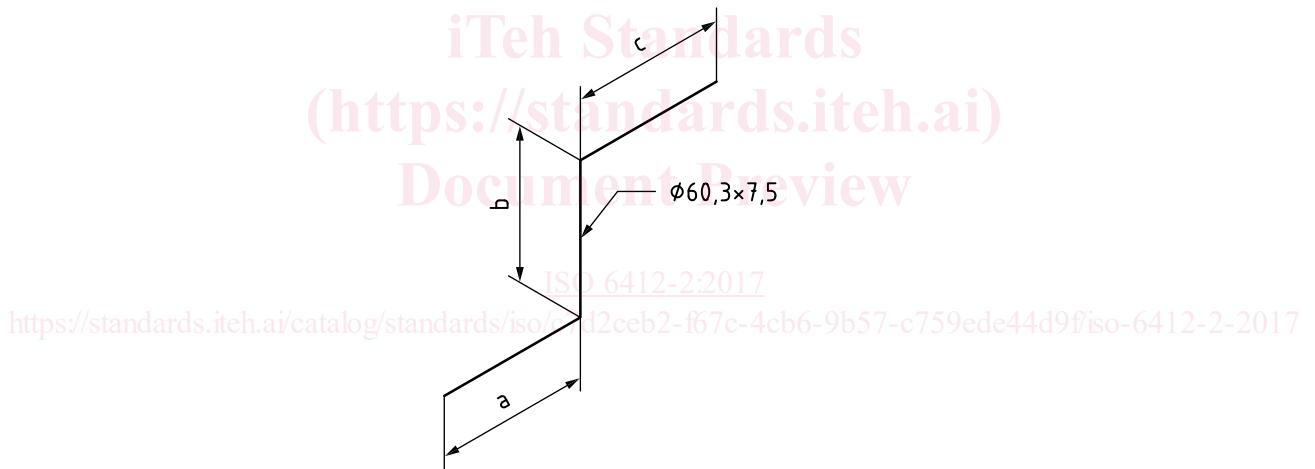


Figure 6

7.5 Radii and angles of bends

Radii and angles of bends may be indicated as shown in [Figure 7](#).

The functional angle shall be indicated.

Bends may be simplified by extending the straight length of the flow line to the vertex. However, the actual bends in the pipes may be shown for the sake of clarity. In this case, if projections of bends would otherwise have been elliptical, these projections may be simplified by drafting circular arcs.