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Technical product documentation (TPD) — General principles of representation —

Part 2:
Basic conventions for lines

Documentation technique de produits (TPD) — Principes généraux de représentation —

Partie 2: Conventions de base pour les traits

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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 of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 10, *Technical product documentation*.

This first edition cancels and replaces the following documents:

— ISO 128-20:1996

— ISO 128-21:1997

— ISO 128-22:1999

— ISO 128-23:1999

— ISO 128-24:2014

— ISO 128-25:1999

The main changes to these documents are as follows:

— harmonization of the former parts listed above;

— introduction of the hierarchy of overlapping lines.

A list of all parts in the ISO 128 series can be found on the ISO website.

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

ISO 128-2 contains generally applicable rules for the presentation of lines in all kinds of technical product documentation.

All figures in this document have been drawn in first-angle projection. It should be understood that third-angle projection or other methods could have been used equally well without prejudice to the principles established.

The application of lines within drawings of special technical fields varies considerably. Therefore, rules of application specific to technical fields are given in Annexes B to G.

Annex A provides information for the calculation of the most important basic types of non-continuous lines according to types of lines and their line elements.

Technical product documentation (TPD) — General principles of representation —

Part 2:
Basic conventions for lines

1 Scope

This document establishes the types of lines used in technical drawings (e.g. diagrams, plans or maps), their designations and their configurations, as well as general rules for the draughting of lines. In addition, this document specifies general rules for the representation of leader and reference lines and their components as well as for the arrangement of instructions on or at leader lines in technical documents. Annexes have been provided for specific information on mechanical, construction and shipbuilding technical drawings.

For the purposes of this document the term "technical drawing" is interpreted in the broadest possible sense encompassing the total package of documentation specifying the product (workpiece, subassembly, assembly).

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 128-3, *Technical drawings — General principles of representation — Part 3: Views, sections and cuts*

ISO 128-15, *Technical product documentation (TPD) — General principles of presentation — Part 15: Presentation of shipbuilding drawings*

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

ISO 129-5, *Technical product documentation (TPD) — Presentation of dimensions and tolerances — Part 5: Dimensioning of structural metal work*

ISO 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 2203, *Technical drawings — Conventional representation of gears*

ISO 2538-2, *Geometrical product specifications (GPS) — Wedges — Part 2: Dimensioning and tolerancing*

ISO 2553, *Welding and allied processes — Symbolic representation on drawings — Welded joints*

ISO 3040, *Geometrical product specifications (GPS) — Dimensioning and tolerancing — Cones*

ISO 3766, *Construction drawings — Simplified representation of concrete reinforcement*

ISO 4463-1, *Measurement methods for building — Setting-out and measurement — Part 1: Planning and organization, measuring procedures, acceptance criteria*

ISO 4463-3, *Measurement methods for building — Setting-out and measurement — Part 3: Check-lists for the procurement of surveys and measurement services*

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

ISO 5455, *Technical drawings — Scales*

ISO 5456-4, *Technical drawings — Projection methods — Part 4: Central projection*

ISO 5459, *Geometrical product specifications (GPS) — Geometrical tolerancing — Datums and datum systems*

ISO 6410-1, *Technical drawings — Screw threads and threaded parts — Part 1: General conventions*

ISO 6428, *Technical drawings — Requirements for microcopying*

ISO 7437, *Technical drawings — Technical drawings — Construction drawings — General rules for execution of production drawings for prefabricated structural components*

ISO 7519, *Technical drawings — Construction drawings — General principles of presentation for general arrangement and assembly drawings*

ISO 8560, *Technical drawings — Construction drawings — Representation of modular sizes, lines and grids*

ISO 10110-1, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 1: General*

ISO 10135, *Geometrical product specifications (GPS) — Drawing indications for moulded parts in technical product documentation (TPD)*

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

ISO 11091, *Construction drawings — Landscape drawing practice*

ISO 12671, *Thermal spraying — Thermally sprayed coatings — Symbolic representation on drawings*

ISO 15785, *Technical drawings — Symbolic presentation and indication of adhesive, fold and pressed joints*

ISO 15787, *Technical product documentation — Heat-treated ferrous parts — Presentation and indications*

ISO 16792, *Technical product documentation — Digital product definition data practices*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10209 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
graphical basic element
continuous graphical object with rounded or squared end shape which is represented in any way (e.g. straight, curved), which has a length and a width

Note 1 to entry: See Figure A.1.

3.2
dot
graphical basic element (3.1) having a length equal to the width, *d*

Note 1 to entry: See Figure A.2.

3.3
line
set of one or more *graphical basic elements* (3.1) having a length of more than the width

Note 1 to entry: See Figure A.3.

3.4
technical drawing
drawing showing a technical installation, process or product with a view to clarifying its structure and enabling its construction

[SOURCE: ISO 5127:2017, 3.4.7.54, modified — Note 1 to entry removed.]

4 Types of lines

4.1 General

The line type designation consists of a combination of a basic line type and a subtype, depending on the line width, see 4.2.

For the purposes of this document a line type application number is used to number the application examples for the line types.

For applying line types to construction technical drawings Annex B shall be applied. For applying line types to mechanical engineering technical drawings Annex D shall be applied. For applying line types to ship building technical drawings Annex F shall be applied.

4.2 Basic types

The basic line types are given in Table 1.

Table 1 — Basic line types

No.	Representation	Description
01		Continuous line
02		Dashed line
03		Dashed spaced line
04		Long-dashed dotted line
05		Long-dashed double-dotted line
06		Long-dashed triplicate-dotted line
07		Dotted line
08		Long-dashed short-dashed line

Table 1 *(continued)*

No.	Representation	Description
09		Long-dashed double-short-dashed line
10		Dashed dotted line
11		Double-dashed dotted line
12		Dashed double-dotted line
13		Double-dashed double-dotted line
14		Dashed triplicate-dotted line
15		Double-dashed triplicate-dotted line

4.3 Line sub types

The line sub types are given in Table 2.

Table 2 — Line sub types

Sub-type no.[a]	Representation	Description
.1		Narrow
.2		Wide
.3		Extra wide

[a] Line identification structure

4.4 Variations of the basic types of lines

The straight lines in Table 1 and the line widths of Table 2 can have variations as shown in Table 3.

Table 3 — Line variations

Representation	Description
	Uniform wavy continuous line
	Uniform spiral continuous line
	Uniform zigzag continuous line
	Freehand / freeform curve continuous line

NOTE Table 3 contains only variations of the basic type of line No. 01. Variations of the basic types of Nos. 02 to 15 are possible and are presented in the same way.

4.5 Combinations of lines with the same length

4.5.1 Arrangement of two or more lines parallel to each other

For examples see Figure 1.

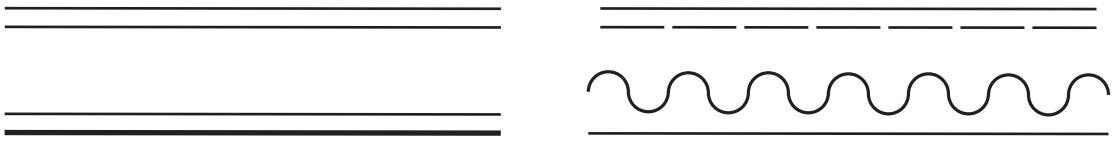

Figure 1 — Example of lines parallel to each other

4.5.2 Arrangement of two different types of lines

a) With different line widths superimposed. See Figure 2 a) and b) for examples.

a) A continuous line and a dotted line **b) A continuous line and a dashed spaced line**

Figure 2 — Example of superimposed lines

b) Arranged next to each other. See Figure 3 for an example.

Figure 3 — Two continuous narrow lines either side of a wide dashed line

4.5.3 Arrangement of two continuous lines parallel to each other with regularly recurring connecting elements between them

See Figure 4 a) and b) for examples.

a) Filled circular elements **b) Filled trapezoidal elements**

Figure 4 — Example of lines parallel to each other with regularly recurring connecting elements

4.5.4 Arrangement of regularly recurring geometric pictorial elements in association with continuous lines

a) Without interruption of a continuous line. See Figure 5 for examples.

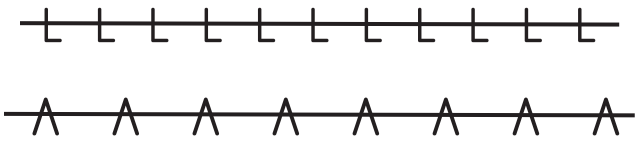

Figure 5 — Without interruption of a continuous line

b) With interruption of a continuous line. See Figure 6 for examples.

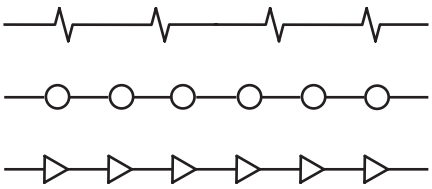

Figure 6 — With interruption of a continuous line

5 Line dimensions

5.1 Line width

The width, *d*, of all types of lines shall be one of the following depending on the type and size of the technical drawing. This series is based on a common ratio 1: $\sqrt{2}$ (≈1:1,4).

0,13 mm; 0,18 mm; 0,25 mm; 0,35 mm; 0,5 mm; 0,7 mm; 1 mm; 1,4 mm; 2 mm.

The widths of extra wide, wide and narrow lines are in the ratio 4:2:1.

The line width of any one line shall be constant throughout the whole line.

See Annexes B, D and F for information on line widths pertaining to construction, mechanical and shipbuilding technical drawings.

5.2 Deviation in line width

Line widths can deviate from those specified in 5.1 providing that it is possible to differentiate unambiguously between two adjacent lines with different widths. If technical drawing equipment which produces constant line width is used, the deviation in line width between two such lines shall not be greater than ± 0,1*d*.

5.3 Configuration of lines

For the preparation of technical drawings, the lengths of line elements should conform to those of Table 4.

Table 4 — Lengths of line elements

Drawing element	Line type no.	Length
Dot	04 to 07 and 10 to 15	≤ *d*
Gap	02 and 04 to 15	3*d*
Short dash	08 and 09	6*d*
Dash	02, 03 and 10 to 15	12*d*
Long dash	04 to 06, 08 and 09	≈24*d*
Space	03	18*d*

NOTE The lengths shown in this table are valid for line elements with semi-circular and squared ends. In the case of line elements with semi-circular ends, the length of the line element corresponds to the distance covered by a technical pen (with a tubular tip and using India ink) from the origin up to the end of the line element. The total length of such a line element is the sum of the length shown in this table, plus *d*.

Formulae for the calculation of some of the basic types of lines and line elements are given in Annex A. The formulae are intended to facilitate the preparation of technical drawings using computer-aided design (CAD) systems.

6 Draughting of lines

6.1 Spacing

The minimum space between parallel lines should not be less than 0,7 mm.

In certain cases when computer-aided technical drawing techniques are used, the spacing of lines on the technical drawing does not represent the actual spacing, for example for the representation of screw threads. This has to be considered when data sets are established, for example for the operation of machine tools.

6.2 Junctions

6.2.1 Types

The basic types of lines, nos. 02 to 06 and nos. 08 to 15, should meet at a dash to avoid ambiguity; see Figures 7 to 12.

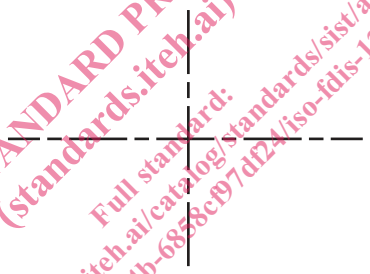

Figure 7 — Long-dashed short-dashed lines intersecting as a cross

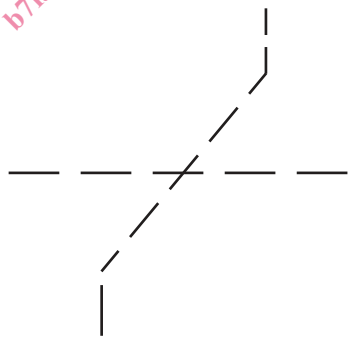

Figure 8 — Dashed lines intersecting as a cross