INTERNATIONAL STANDARD

ISO
128-20

Technical drawings — General principles of presentation —

Part 20:
Basic conventions for lines

Dessins techniques — Principes généraux de représentation —
Partie 20: Conventions de base pour les traits

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 128-20 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation*, Subcommittee SC 1, *Basic conventions*.

This first edition is based on ISO 128:1982, clause 3, and it replaces the rules specified in that clause.

ISO 128 consists of the following parts, under the general title *Technical drawings — General principles of presentation*:

— *Part 20: Basic conventions for lines*

— *Part 21: Preparation of lines by CAD systems*

— *Part 23: Lines on construction drawings*

Further parts of ISO 128 are planned, covering other general principles of presentation including those for the application of lines within drawings of various technical fields.

Annex A of this part of ISO 128 is for information only.

Introduction

ISO 128-20 was prepared as ISO/DIS 12011-1.

ISO 128-20 contains generally applicable rules for the presentation of lines in all kinds of technical product documentation.

The application of lines within drawings of special technical fields varies considerably. Therefore rules of application are not given in this part of ISO 128.

Other International Standards containing rules for lines in specialized fields are listed in annex A.

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Technical drawings — General principles of presentation —

Part 20:
Basic conventions for lines

1 Scope

This part of ISO 128 establishes the types of lines, their designations and their configurations, as well as general rules for draughting of lines used in technical drawings, e.g. diagrams, plans or maps.

2 Definitions

For the purposes of this part of ISO 128, the following definitions apply.

2.1 line: Geometrical object, the length of which is more than half of the line width and which connects an origin with an end in any way, e.g. straight, curved, without or with interruptions.

NOTES

1   The origin and the end may coincide with one another, e.g. in the case of a line forming a circle.

2   A line, the length of which is less than or equal to half of the line width, is called a dot.

3   A test should be made in order to check the appearance of drawings intended to be microcopied or transferred by fax.
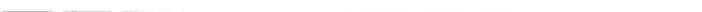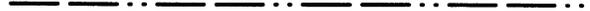
2.2 line element: Single part of a non-continuous line, e.g. dots, dashes, which vary in length, and gaps.

2.3 line segment: Group of two or more different line elements which form a non-continuous line, e.g. long dash/gap/dot/gap/dot/gap.

3 Types of lines

3.1 Basic types

Table 1

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
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

3.2 Variations of the basic types of lines

Possible variations of the basic types of lines in accordance with table 1 are given in table 2.

Table 2

Representation	Description
	uniform wavy continuous line
	uniform spiral continuous line
	uniform zigzag continuous line
	freehand continuous line

NOTE — Table 2 contains only variations of the basic type of line No. 01. Variations of the basic types Nos. 02 to 15 are possible and are presented in the same way.

3.3 Combinations of lines with the same length

3.3.1 Arrangement of two or more lines parallel to each other

For examples see figure 1.
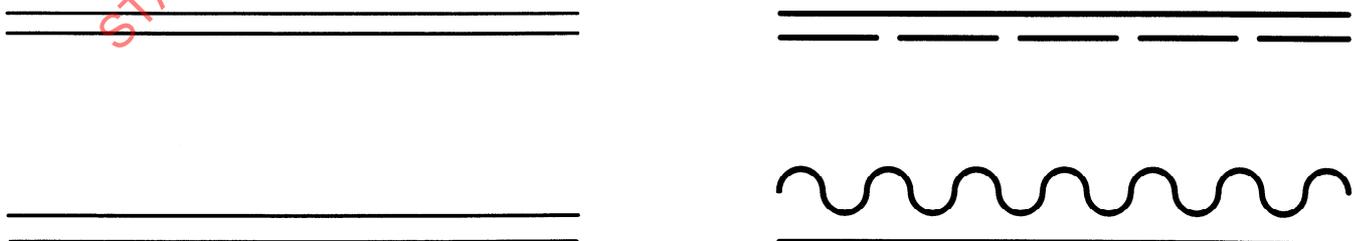
Figure 1

3.3.2 Arrangement of two different types of lines

a) With different line widths superimposed.

   See figure 2 a) and b) for examples [figure 2 a): a continuous and a dotted line; figure 2 b): a continuous and a dashed spaced line].

a)

b)

Figure 2

b) Arranged next to each other.

   See figure 3 for an example (two continuous lines either side of two dashed spaced lines).

Figure 3

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

See figure 4 a) and b) for examples [figure 4 a): blackened circular elements; figure 4 b): blackened trapezoidal elements].

a)

b)

Figure 4

4

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

a) Without interruption of a continuous line.

See figure 5 for examples.
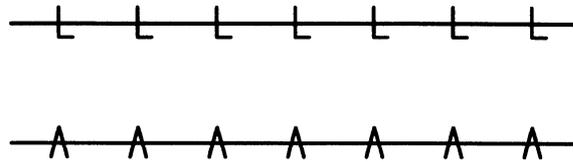
Figure 5

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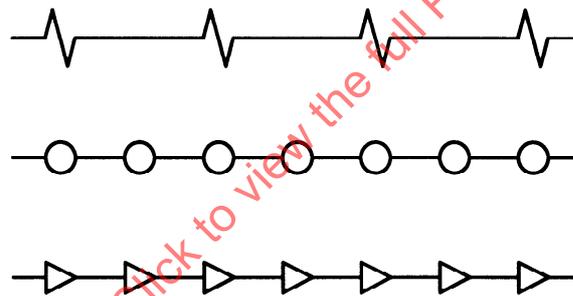
See figure 6 for examples.

Figure 6

4 Line dimensions

4.1 Line width

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

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.

4.2 Deviation in line width

Line widths may deviate from those specified in 4.1 providing that it is possible to differentiate unambiguously between two adjacent lines with different widths. If drawing equipment which produces constant line width is used, the deviation in line width between two such lines shall not be greater than $\pm$ 0,1d.

4.3   Configuration of lines

For the preparation of drawings by hand the lengths of line elements should conform to those of table 3.

Table 3

Line element	Line type No.	Length
Dots	04 to 07 and 10 to 15	$\leqslant 0{,}5d$
Gaps	02 and 04 to 15	$3d$
Short dashes	08 and 09	$6d$
Dashes	02, 03 and 10 to 15	$12d$
Long dashes	04 to 06, 08 and 09	$24d$
Spaces	03	$18d$
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 semicircular 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 table 3 plus d.		

Formulae for the calculation of some of the basic types of line and line elements are given in ISO 128-21. The formulae are intended to facilitate the preparation of drawings using computer-aided design (CAD) systems.

5   Draughting of lines

5.1   Spacing

The minimum space between parallel lines should not be less than 0,7 mm, unless rules to the contrary are stated in other International Standards.

NOTE 4   In certain cases when computer-aided drawing techniques are used, the spacing of lines on the drawing does not represent the actual spacing, e.g. for the representation of screw threads. This fact has to be considered when data sets are established, e.g. for the operation of machine tools.

5.2 Junctions

5.2.1 Types

The basic types of lines, Nos. 02 to 06 and Nos. 08 to 15 should preferably meet at a dash; see figures 7 to 12.
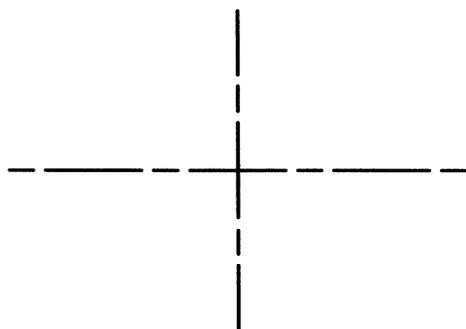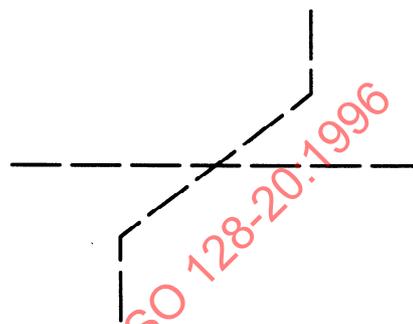
Figure 7

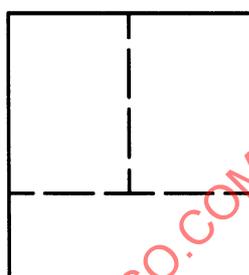**Figure 8**

Figure 9
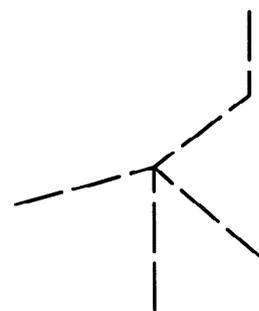
Figure 10
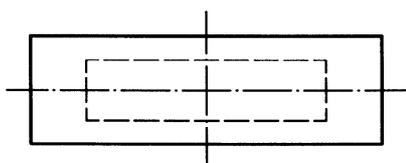
Figure 11
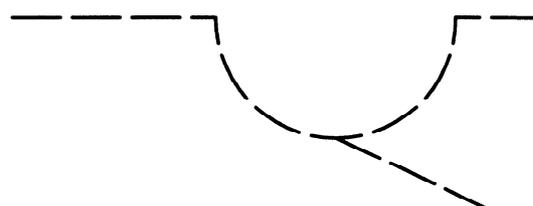
Figure 12

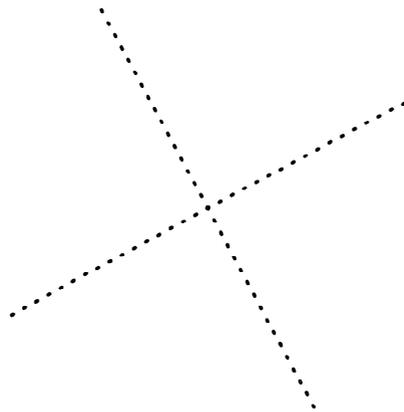Lines of basic type No. 07 should preferably meet at a dot, see figure 13.

Figure 13

5.2.2 Representation

The requirement of 5.2.1 shall be fulfilled by starting the lines at the junction (see figure 14) or by using a complete, or partial, cross formed by dashes (see figures 15 and 16).
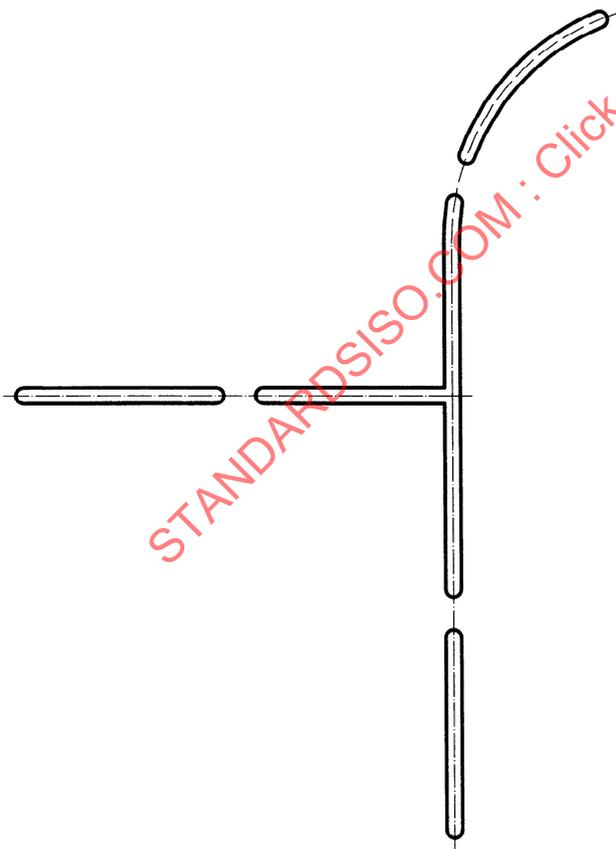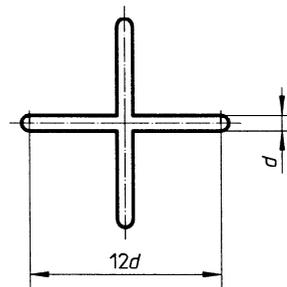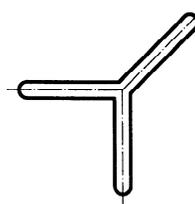
Figure 15

Figure 14

Figure 16