INTERNATIONAL STANDARD

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Technical drawings — General principles of presentation —

Part 24:
Lines on mechanical engineering drawings

Dessins techniques — Principes généraux de représentation —
Partie 24: Traits utilisés pour les dessins industriels

Reference number
ISO 128-24:1999(E)

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 organziations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) in all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 128-24 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation*, Subcommittee SC 1, *Basic conventions*.

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 22: Basic conventions and applications for leader lines and reference lines*

— *Part 23: Lines on construction drawings*

— *Part 24: Lines on mechanical engineering drawings*

— *Part 25: Lines on shipbuilding drawings*

— *Part 30: Basic conventions for views*

— *Part 31: Additional conventions for views*

— *Part 40: Basic conventions for cuts and sections*

— *Part 41: Cuts and sections for mechanical engineering drawings*

— *Part 50: Basic conventions for representing areas on cuts and sections*

— *Part 60: Additional conventions for cuts and sections*

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

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Technical drawings — General principles of presentation —

Part 24:
Lines on mechanical engineering drawings

1 Scope

This part of ISO 128 specifies general rules and basic conventions for the types of lines on mechanical engineering drawings.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 128. For dated references, subsequent amendments to, or revisions of, these publications do not apply. However, parties to agreements based on this part of ISO 128 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 128-20:1996, *Technical drawings — General principles of presentation — Part 20: Basic conventions for lines.*

ISO 128-22:1999, *Technical drawings — General principles of presentation — Part 22: Basic conventions and applications for leader lines and reference lines.*

ISO 128-30:—[1)], *Technical drawings — General principles of presentation — Part 30: Basic conventions for views.*

ISO 128-40:—[1)], *Technical drawings — General principles of presentation — Part 40: Basic conventions for cuts and sections.*

ISO 128-50:—[1)], *Technical drawings — General principles of presentation — Part 50: Basic conventions for representing areas on cuts and sections.*

ISO 129:1985, *Technical drawings — Dimensioning — General principles, definitions, methods of execution and special indications.*

ISO 2203:1973, *Technical drawings — Conventional representation of gears.*

ISO 3040:1990, *Technical drawings — Dimensioning and tolerancing — Cones.*

ISO 5261:1995, *Technical drawings — Simplified representation of bars and profile sections.*

ISO 6410-1:1993, *Technical drawings — Screw threads and threaded parts — Part 1: General conventions.*

[1)] To be published.

ISO 6428:1982, *Technical drawings — Requirements for microcopying.*

ISO 10135:1994, *Technical drawings — Simplified representation of moulded, cast and forged parts.*

ISO 10578:1992, *Technical drawings — Tolerancing of orientation and location — Projected tolerance zone.*

3 General principles

The basic types of lines, their designations and dimensions as well as general rules for draughting of lines are specified in ISO 128-20.

Requirements for microcopying are specified in ISO 6428.

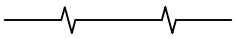
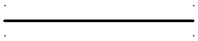
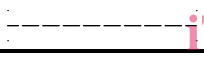
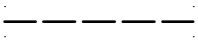
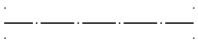
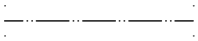
4 Types of lines and their application

The first part of the line number in Table 1 is the number of the basic type in accordance with ISO 128-20.

Table 1 — Types of lines and applications

Line				Reference to ISO
No.	Description and representation		Application	
01.1	Continuous narrow line	.1	imaginary lines of intersection	—
		.2	dimension lines	129
		.3	extension lines	129
		.4	leader lines and reference lines	128-22
		.5	hatching	128-50
		.6	outlines of revolved sections	128-40
		.7	short centre lines	—
		.8	root of screw threads	6410-1
		.9	origin and terminations of dimension lines	129
		.10	diagonals for the indication of flat surfaces	—
		.11	bending lines on blanks and processed parts	—
		.12	framing of details	—
		.13	indication of repetitive details	—
		.14	interpretation lines of tapered features	3040
		.15	location of laminations	—
		.16	projection lines	—
		.17	grid lines	—
	Continuous narrow freehand line	.18	preferably manually represented termination of partial or interrupted views, cuts and sections, if the limit is not a line of symmetry or a centre line[a]	—

Table 1 *(continued)*

Line No.	Line Description and representation	Application		Reference to ISO
01.1	Continuous narrow line with zigzags 	.19	mechanically represented termination of partial or interrupted views, cuts and sections, if the limit is not a line of symmetry or a centre line[a]	—
01.2	Continuous wide line 	.1	visible edges	128-30
		.2	visible outlines	128-30
		.3	crests of screw threads	6410-1
		.4	limit of length of full depth thread	6410-1
		.5	main representations in diagrams, maps, flow charts	—
		.6	system lines (structural metal engineering)	5261
		.7	parting lines of moulds in views	10135
		.8	lines of cuts and section arrows	128-40
02.1	Dashed narrow line 	.1	hidden edges	128-30
		.2	hidden outlines	128-30
02.2	Dashed wide line 	.1	indication of permissible areas of surface treatment, e.g. heat treatment	—
04.1	Long-dashed dotted narrow line 	.1	centre lines	—
		.2	lines of symmetry	—
		.3	pitch circle of gears	2203
		.4	pitch circle of holes	—
04.2	Long-dashed dotted wide line 	.1	indication of (limited) required areas of surface treatment, e.g. heat treatment	—
		.2	position of cutting planes	128-40
05.1	Long-dashed double-dotted narrow line 	.1	outlines of adjacent parts	—
		.2	extreme positions of movable parts	—
		.3	centroidal lines	—
		.4	initial outlines prior to forming	—
		.5	parts situated in front of a cutting plane	—
		.6	outlines of alternative executions	—
		.7	outlines of the finished part within blanks	10135
		.8	framing of particular fields/areas	—
		.9	projected tolerance zone	10578

[a] It is recommended to use only one type of line on one drawing.

Examples of applications are given in annex A.

5 Line widths and line groups

On mechanical engineering drawings two line widths are normally used. The proportions between the line widths should be 1:2.

The line groups are specified as shown in Table 2.

Table 2 — Line groups

Dimensions in millimetres

Line group	Line widths for line No.	
	01.2 - 02.2 - 04.2	01.1 - 02.1 - 04.1 - 05.1
0,25	0,25	0,13
0,35	0,35	0,18
0,5[a]	0,5	0,25
0,7[a]	0,7	0,35
1	1	0,5
1,4	1,4	0,7
2	2	1

[a] Preferred line groups

The widths and groups of lines should be chosen according to the type, size and scale of the drawing and according to the requirements for microcopying and/or other methods of reproduction.

Annex A
(informative)

Examples of application

Table A.1 gives examples of the application of the different types of lines indicating the reference number given in Table 1. The figures are shown in first angle projection. It is understood that third angle projection could be used as well.

Table A.1 — Examples of application

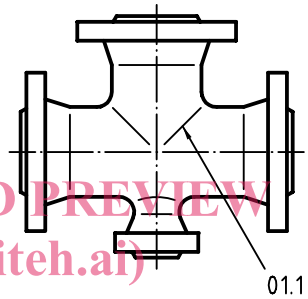
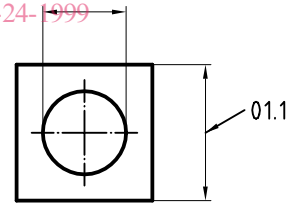
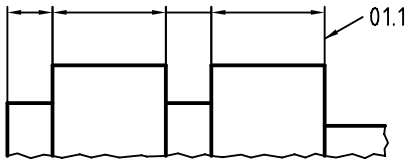
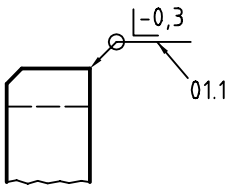
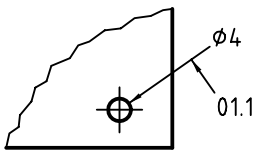
01.1	**Continuous narrow line**
01.1.1	Imaginary lines of intersection 
01.1.2	Dimension lines 
01.1.3	Extension lines 
01.1.4	Leader lines and reference lines  

Table A.1 *(continued)*

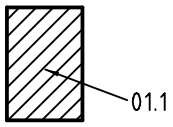
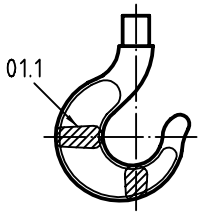
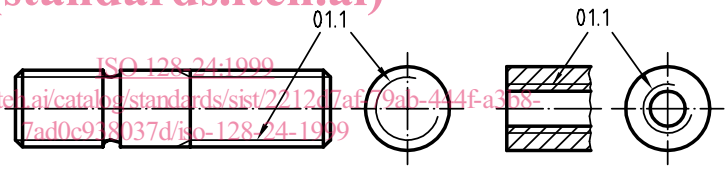
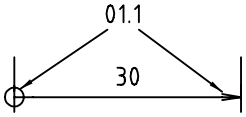
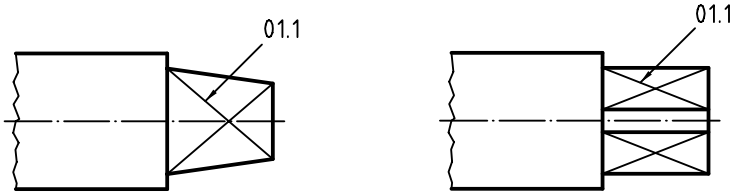
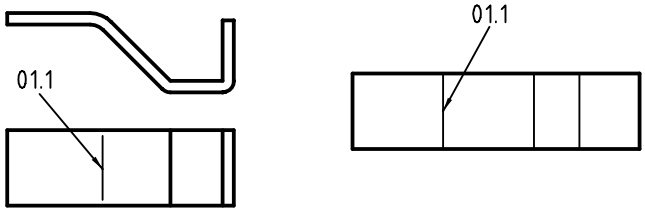
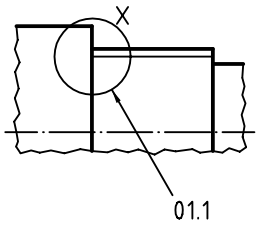
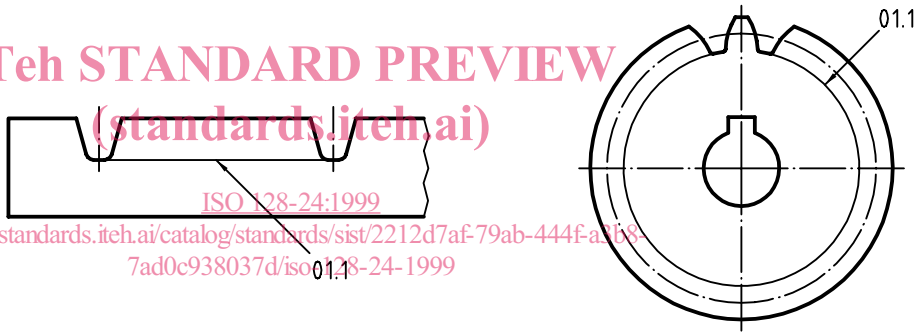
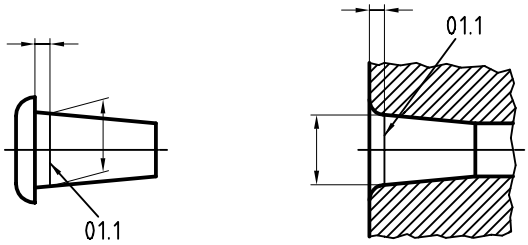
01.1.5	Hatching 
01.1.6	Outlines of revolved sections 
01.1.7	Short centre lines 
01.1.8	Root of screw threads 
01.1.9	Origin and terminations of dimension lines 
01.1.10	Diagonals for the indication of flat surfaces 

Table A.1 *(continued)*

01.1.11	Bending lines on blanks and processed parts 
01.1.12	Framing of details 
01.1.13	Indication of repetitive details, e.g. root diameters of gears 
01.1.14	Interpretation lines of tapered features 
01.1.15	Location of laminations, e.g. transformer plates