INTERNATIONAL STANDARD

ISO 16018

First edition
1999-07-15

Technical drawings — Numerically controlled draughting machines — Draughting media and tools for vector plotters

Dessins techniques — Machines à dessiner à commande numérique — Supports et outils de traçage pour traceurs de vecteurs

Reference number
ISO 16018:1999(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 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.

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 16018 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation*, Subcommittee SC 9, *Media equipment for drawing and related documentation*.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

Technical drawings — Numerically controlled draughting machines — Draughting media and tools for vector plotters

1 Scope

This International Standard gives recommendations on the selection of combinations of draughting tools and media for vector plotters. It is only applicable to the draughting tools and media covered herein.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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 9177-2:1989, *Mechanical pencils — Part 2: Black leads — Classification and dimensions.*

ISO 9957-1:1992, *Fluid draughting media — Part 1: Water-based India ink — Requirements and test conditions.*

ISO 9957-2:1995, *Fluid draughting media — Part 2: Water-based non-India ink — Requirements and test conditions.*

ISO 9958-1:1992, *Draughting media for technical drawings — Draughting film with polyester base — Part 1: Requirements and marking.*

ISO 9961:1992, *Draughting media for technical drawings — Natural tracing paper.*

ISO 12756:1998, *Drawing and writing instruments — Ball point pens and roller ball pens — Vocabulary.*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1 Output form

3.1.1
plot
graphic image created by a numerically controlled draughting machine on draughting media

3.1.2
check plot
plot for verification of completeness and absence of mistakes with no special requirements with respect to line quality

3.1.3
technical drawing plot
plot which contains all the necessary characteristics for a technical drawing with legibility and reproducibility

3.1.4
business graphic plot
plot for business presentations consisting of colours, lines and filled areas

3.2 Draughting media for plotting

3.2.1 Paper

3.2.1.1
check plot paper
paper without special performance requirements

3.2.1.2
opaque non-coated paper
paper which is manufactured in such a way that technical drawings or business graphics can be made on it

3.2.1.3
opaque coated glossy paper
paper with a glossy surface which is manufactured in such a way that high-contrast colour presentations can be made on it

3.2.1.4
opaque coated smooth paper
paper with a surface which is manufactured in such a way that high-contrast colour presentations can be made on it

NOTE The surface can be from matt to satin smooth.

3.2.1.5
semi-opaque non-coated paper
paper with a higher light transmitting property compared to opaque paper

3.2.1.6
natural tracing paper
drawing paper for use with ink and/or pencil, the translucency of which is achieved by mechanical treatment during the manufacturing process

[ISO 9961:1992]

3.2.1.7
vellum
100 % rag paper, the light transmitting properties of which are achieved by mechanical treatment

3.2.2
draughting film
film for drawn and written information with either chemically or mechanically produced drawing surfaces on one or both sides

[ISO 9958-1:1992]

3.2.2.1
matt polyester film
medium designed to exhibit high dimensional stability and mechanical strength

3.2.2.2
matt polypropylene film
medium of lower thermal dimensional stability and mechanical strength than polyester film

3.2.2.3
non-coated overhead film
transparent polymer film intended for plotting with solvent based inks

3.2.2.4
coated overhead film
transparent polymer film intended for plotting quick drying images with water based inks

3.2.3
laminated medium
medium consisting of film and paper laminated together

3.3 Draughting tools for plotting

3.3.1
pen
writing instrument equipped with a feeding system which deposits a writing fluid on a surface[1)]

NOTE It is available in refillable or non-refillable (disposable) form.

[ISO 12756:1998]

3.3.2
tubular tip for paper
instrument having a tubular point with a polished writing surface intended for paper

3.3.3
tubular tip for film
instrument having a tubular abrasion resistant point intended for abrasive draughting surfaces

3.3.4
roller ball pen
ball pen which deposits a writing fluid with a maximum dynamic viscosity of 1 000 mPa·s (1 000 cP) at 23 °C ± 2 °C

[ISO 12756:1998]

3.3.5
ball point pen
ball pen which deposits a writing fluid with a dynamic viscosity greater than 1 000 mPa·s (1 000 cP) at 23 °C ± 2 °C

[ISO 12756:1998]

3.3.6
gas pressurized pen
ball point pen with a gas pressurized filling to provide adequate delivery of paste ink at high plotting speeds

3.3.7
fibre tip pen
pen in which the plotting fluid is delivered by means of fibres aligned in an axial direction

3.3.8
plastic tip pen
pen in which the plotting fluid is delivered by means of a capillary in an extruded plastic tip

3.3.9
ceramic tip pen
pen in which the plotting fluid is delivered by means of a tubular ceramic element

---

1) For the purpose of this International Standard pens can also be used as draughting instruments.

3.3.10
ceramic lead
black lead in which the binding agent is clay

[ISO 9177-2:1989]

3.3.11
polymer lead
black lead in which the binding agent is an organic polymer

[ISO 9177-2:1989]

3.4 Draughting fluids for plotting

3.4.1
India ink
China ink
water-based drawing fluid that contains dispersed carbon black as its primary colorant

[ISO 9957-1:1992]

3.4.2
non-India ink
black water-based draughting fluid that contains a colorant such as (but not limited to) one or more of the following: dyes, dispersions of dyes, microfine organic pigments, etc., but does not contain carbon black as its primary colorant

[ISO 9957-2:1992]

3.4.3
solvent based ink

plotting fluid that contains as its primary vehicle a solvent with a vapour pressure higher than that of water ink

3.4.4
paste ink
writing fluid with a dynamic viscosity greater than 1 000 mPa·s (1 000 cP) at 23 °C ± 2 °C to be used for ball point pens

4 Recommendations

The suitability criteria for the various combinations of draughting tools and media for plotting are limited to those given in Tables 1 and 2.

The suitability criteria are classified as follows:

— for plotter pen/media selection:

  ++ = preferred;

  + = good;

  – = not compatible;

— for plotting media properties selection:

  ++ = excellent;

  + = good;

  – = poor.

These recommendations are intended to provide guidance as to the suitability for application areas.

Table 1 — Plotter pen/media selection

Plotting tool			Ink	Check plot	Technical drawing plot							Business graphic plot				
					Paper					Film		Opaque paper			Overhead film	
				Check plot paper	Opaque	Translucent				Polyester	Polypro-pylene	Coated glossy	Coated smooth	Non-coated matt	Non-coated	Coated
					Non-coated	Semi-opaque	Vellum	Laminate	Natural							
Tubular tip	For paper	Disposable	India	+	++	+	++	++	++	–	–	–	–	++	–	–
		Refillable disposable	Non-India	+	+	+	+	+	+	–	–	–	–	++	–	–
		Refillable	India	+	++	+	++	++	++	–	–	–	–	++	–	–
	For film	Disposable	India	–	+	–	–	–	–	++	++	–	–	+	–	–
		Refillable	India	–	+	–	–	–	–	++	++	–	–	+	–	–
		Refillable	India	–	–	–	–	–	–	++	+	+	–	–	–	–
		V groove	Solvent	–	–	–	–	–	–	–	–	–	–	–	+	–
Roller ball		Disposable	Non-India	++	–	–	–	–	–	–	–	–	+	+	–	–
			Paste	++	–	–	–	–	–	–	–	–	+	+	–	–
Fibre tip pen		Plastic	Non-India	+	–	–	–	–	–	–	–	++	++	++	–	++
		Ceramic	Solvent	–	–	–	–	–	–	–	–	–	–	–	++	+
			Non-India	+	+	–	+	+	+	–	–	+	+	++	–	–
Mechanical lead				+	+	–	+	+	+	++	+	–	–	–	–	–

Key: ++ preferred + acceptable – not compatible

Table 2 — Plotting media properties selection

Media characteristics		Check plot	Technical drawing plot							Business graphic plot				
		Check plot paper	Paper					Film		Opaque paper			Overhead film	
			Opaque	Translucent				Poly-ester	Polypro-pylene	Coated glossy	Coated smooth	Non-coated matt	Non-coated	Coated
			Non-coated	Semi-opaque	Vellum	Lami-nate	Natural							
Dimensional stability		+	+	+	+	+	–	++	+	+	+	+	++	++
Mechanical strength		+	+	+	+	+	+	++	+	+	+	+	++	++
Archivability		+	+	+	++	+	+	++	+	+	+	+	+	+
Reproduction suitability	Transmitted light	–	–	+	+	++	++	++	++	–	–	–	–	–
	Reflected light	+	++	+	+	+	+	+	+	++	++	++	–	–
Key: ++ excellent + good – poor														
NOTE The criteria for archivability and permanence are still being developed, the entries in the rows are given as a rough guide.														

Bibliography

[1] ISO 9179-1:1988, *Technical drawings — Numerically controlled draughting machines — Part 1: Vocabulary*.

[2] ISO 9959-1:1992, *Numerically controlled draughting machines — Drawing test for the evaluation of performance — Part 1: Vector plotters*.