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Roller ball pens and refills —

Part 1: General use

*Stylos rollers et recharges —
Partie 1: Utilisation générale*

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Reference number
ISO 14145-1:1998(E)

Foreword

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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 14145-1 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation*, Subcommittee SC 9, *Media and equipment for drawing and related documentation*.

ISO 14145 consists of the following parts, under the general title *Roller ball pens and refills*:

- Part 1: *General use*
- Part 2: *Documentary use (DOC)*

Annex A of this part of ISO 14145 is for information only.

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Introduction

This part of ISO 14145 is applicable to roller ball pens for general use. Part 2 of ISO 14145 is applicable to roller ball pens for documentary use.

For documentary use, some requirements, in addition to those for general use, are necessary

- a) to assure the legibility of lettering, and
- b) for the handling and storage of documents during long periods of time (these requirements are often discussed with the archivist).

An example of documentary use is the preparation of documents that are required as evidence.

Furthermore, pens which meet the requirements for documentary use produce lines which are more resistant to modification (e.g. attempts to falsify a document) than those for general use.

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Roller ball pens and refills —

Part 1: General use

1 Scope

This part of ISO 14145 establishes minimum quality requirements for roller ball pens (refillable and non-refillable) and refills for general use.

Additional requirements for roller ball pens for documentary use are given in ISO 14145-2.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 14145. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 14145 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 105-A02:1993, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour.*

ISO 105-B02:1994, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test.*

ISO 534:1988, *Paper and board — Determination of thickness and apparent bulk density or apparent sheet density.*

ISO 535:1991, *Paper and board — Determination of water absorptiveness — Cobb method.*

ISO 536:1995, *Paper and board — Determination of grammage.*

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications.*

ISO 868:1985, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness).*

ISO 2144:1997, *Paper, board and pulp — Determination of residue (ash) an ignition at 900 °C.*

ISO 5627:1995, *Paper and board — Determination of smoothness (Bekk method).*

ISO 6588:1981, *Paper, board and pulps — Determination of pH of aqueous extracts.*

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

3 Definitions

For the purposes of this part of ISO 14145, the definitions given in ISO 12756 apply.

4 Requirements

4.1 Tip classification

Tips shall be classified according to the ball diameter (see table 1).

Table 1

Dimensions in millimetres

Tip classification (line width)	Tip code	Ball diameter
Extra fine	EF	$\varnothing < 0,55$
Fine	F	$0,55 \leq \varnothing < 0,75$
Medium	M	$0,75 \leq \varnothing < 1,20$
Broad	B	$1,20 \leq \varnothing$

4.2 Shapes and dimensions of refills

Refills shall be classified into types A, B, C and D. The shapes and dimensions of types A to C are given in figure 1 and table 2. Refills with shapes and dimensions other than those specified in figure 1 and table 2 are designated type D.

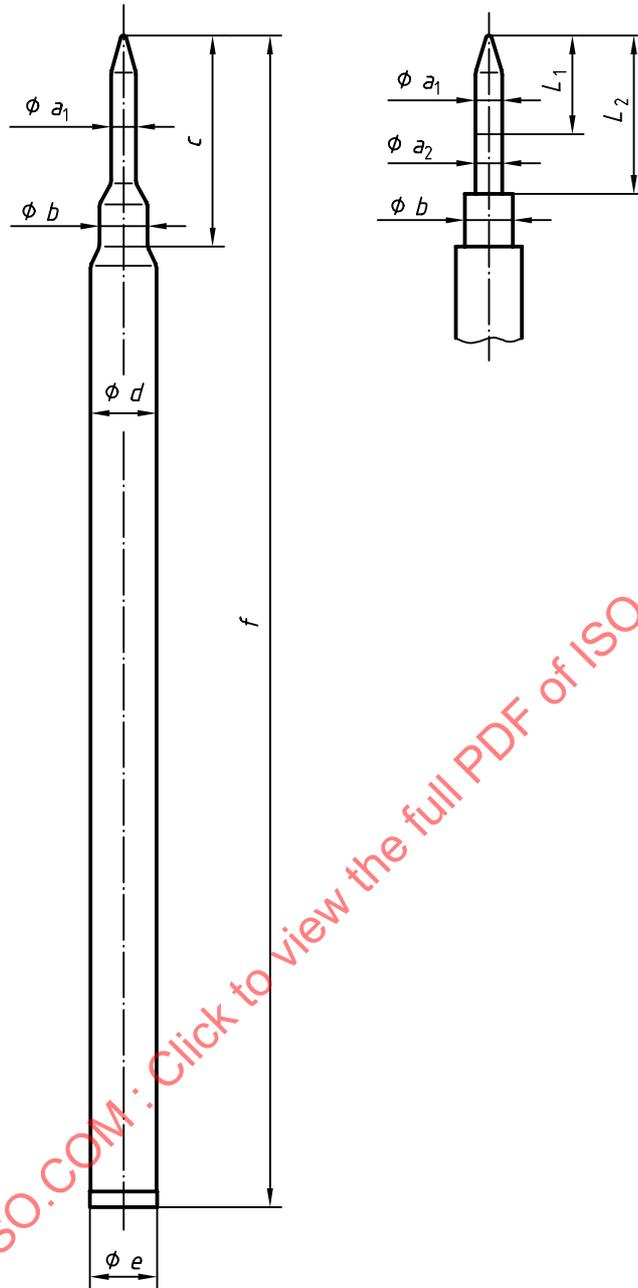


Figure 1

Table 2

Dimensions in millimetres

Type code	$a_1^{1)}$	L_1	a_2	L_2	b	c	d	$e^{2)}$	f
A	$2,3 \pm 0,1$	—	—	—	$4,5 \pm 0,1$	20 ± 1	$6,2 \pm 0,1$	$6,3 \pm 0,3$	111 ± 2
B	$2,3 \pm 0,1$	—	—	—	$4,5 \pm 0,1$	20 ± 1	$6,2 \pm 0,1$	$6,3 \pm 0,3$	87 ± 2
C	$2,5 \pm 0,05$	$9 \pm 0,5$	$2,5^{+0,60}_{-0,05}$	$15 \pm 0,5$	$4,5 \pm 0,05$	$20 \pm 0,5$	$6,3 \pm 0,15$	—	110 ± 1

- 1) Denotes a diameter of a tip holder.
- 2) Denotes outside diameter of an end plug.

4.3 Performance

4.3.1 Writing performance

Smooth writing shall start within 10 cm and the writing distance shall be at least 400 m without obvious starving or fluctuation of line intensity when tested as specified in 6.3.1.

4.3.2 Strike through

No strike through shall be evident to a trained eye when tested as specified in 6.3.2.

4.3.3 Drying time

The line shall be found non-smearing when tested as specified in 6.3.3.

4.3.4 Reproducibility

The reproduced line shall be visible when tested as specified in 6.3.4.

4.3.5 Water resistance

NOTE — This performance is optional and is only applicable to roller ball pens or refills marked "water resistant" (WR).

The line shall remain visible when tested as specified in 6.3.5.

4.3.6 Light resistance

The line shall remain visible when tested as specified in 6.3.6.

4.3.7 Cap-off time

The roller ball pen shall start writing within 10 cm without starving when tested as specified in 6.3.7.

4.3.8 Shelf life

The roller ball pen or refill shall conform with 4.3.1 when tested as specified in 6.3.8.

5 Test equipment and accessories

5.1 Write test machine

The write test machine (see ISO 12756) shall be set to each of the following conditions when performing the machine writing test:

- a) point load: $1_{-0,3}^0$ N;
- b) writing angle: test write a sample at 60^{0+5}_0 and 70^{0-5}_0 , determine at which angle the trace is most consistent and select this angle;
- c) writing speed: 4,5 m/min \pm 0,5 m/min;
- d) writing pattern: continuous spiral line (100 mm circumference) with a pitch between 2 mm and 5 mm.

5.2 Performance testing paper specifications¹⁾

The performance testing paper shall conform to the specifications given in table 4.

Table 4

Specification		Reference International Standard
Grammage:	70 g/m ² ± 10 g/m ²	ISO 536
Smoothness ¹⁾ :	50 s ± 30 s	ISO 5627
Residue after incineration:	(7 ⁺² / ₋₃) % residue (ash) at 900 °C	ISO 2144
Cobb value, Cobb ₆₀ :	25 g/m ² ± 10 g/m ²	ISO 535
pH value:	6,5 ^{+1,0} / _{-1,5}	ISO 6588
Thickness:	80 µm ± 10 µm	ISO 534
Colour:	white	
Composition:	100 % wood cellulose fibre, bleached	
1) Soft backing side used for testing, clamping pressure 1 MPa.		

5.3 Eraser

Rubber eraser without abrasive and with a hardness of 45 ± 5 Shore A in accordance with ISO 868.

5.4 Reproducibility apparatus

Photocopier, microfilm processor or telefacsimile machine.

5.5 Light test apparatus

Fade-o-meter, xenotest or technical equivalent.

6 Testing

6.1 Sampling

Roller ball pen and refill samples shall be tested within six months after manufacture, except for the shelf life test (see 6.3.8).

6.2 Climatic conditions for testing

The test shall be carried out under standard test atmosphere of either 23/50 or 27/65 in accordance with ISO 554 and according to conditions at the place of testing. Ordinary tolerances are to be applied.

6.3 Procedure

6.3.1 Writing performance test

Take a quantity of at least 10 roller ball pens and/or refills at random. Generate a continuous 400 m line on the testing paper specified in 5.2 by the write test machine specified in 5.1 under the climatic conditions specified in 6.2. At start and finish of the writing distance, examine for compliance with 4.3.1.

1) On request the ISO Central Secretariat will provide a list of suppliers of the testing paper.

Use this machine-written test sheet for the following tests, except for 6.3.3 (drying time test), 6.3.7 (cap-off test) and 6.3.8 (shelf life test).

6.3.2 Strike through test

Prepare a machine-written test piece approximately 5 cm long, without the beginning and end of a written line, from the test sheet provided in 6.3.1 and keep it under the climatic conditions specified in 6.2 for 24 h.

Examine the back of the test paper for compliance with 4.3.2.

6.3.3 Drying time test

Draw a straight line in accordance with 5.1 a), b) and c) on the testing paper specified in 5.2.

After 20 s, rub once perpendicularly across the written line with the eraser specified in 5.3.

Examine the line for compliance with 4.3.3.

6.3.4 Reproducibility test

Reproduce the written line from a machine-written test piece approximately 5 cm long from the test sheet provided in 6.3.1 using the apparatus specified in 5.4.

Examine the reproduced line for compliance with 4.3.4.

6.3.5 Water resistance test

Keep a machine-written test piece approximately 5 cm long from the sheet provided in 6.3.1 under the climatic conditions specified in 6.2 for 2 h, then immerse in distilled water or de-ionized water for 1 h. Remove and allow to air dry.

Examine the written line of the test piece for compliance with 4.3.5.

6.3.6 Light resistance test

Expose a machine-written test piece approximately 5 cm long from the test sheet provided in 6.3.1 to the light source of the apparatus specified in 5.5, together with the blue wool references specified in ISO 105-B02, until the contrast between the unexposed and the exposed blue wool reference 3 becomes equal to grey scale grade 4 specified in ISO 105-A02.

Examine the written line of the test piece for compliance with 4.3.6.

6.3.7 Cap-off time test

Remove the cap from the unused roller ball pen and expose the writing tip. After establishing flow, keep it horizontally under the climatic conditions specified in 6.2 for 24 h. Hand-write a straight line and examine it for compliance with 4.3.7.

6.3.8 Shelf life test

Select a quantity of at least 10 recently manufactured and unused roller ball pens and/or refills complete with caps. Store horizontally at a temperature of (40 ± 2) °C and at a relative humidity of (55 ± 5) % for 90 days.

Test in accordance with 6.3.1 and examine for compliance with 4.3.8.

7 Designation and marking

7.1 Designation

The designation of a roller ball pen or refill shall comprise, in the given order, the following elements:

- a) the description block (e.g. "roller ball pen" or "roller ball refill");
- b) the number of this part of ISO 14145 (i.e. ISO 14145-1);
- c) the type classification code for refills (see 4.2);
- d) the tip classification code (EF, F, M or B; see table 1); and
- e) the classification code for water resistant (WR), if applicable.

EXAMPLES

A disposable roller ball pen complying with the requirements of this part of ISO 14145, with medium sized tip (M), shall be designated as follows:

Roller ball pen ISO 14145-1 M

A roller ball refill complying with the requirements of this part of ISO 14145, type B, with broad sized tip (B), water resistant (WR), shall be designated as follows:

Roller ball refill ISO 14145-1 B B WR

7.2 Marking

For identification, disposable roller ball pens or refills shall be marked as follows:

- a) the name of the manufacturer, supplier or trademark;
- b) the designation in accordance with 7.1 [except 7.1 a), which is optional]; and
- c) the date of manufacture (year/month, in full or coded) or the batch number.

8 Test report

The test report shall include the following information:

- a) reference to this part of ISO 14145;
- b) the date and place of test;
- c) precise identification of the samples (see 7.2);
- d) identification of the following variable or optional requirements:
 - test atmosphere (see 6.2),
 - writing angle and writing pitch (see 5.1),
 - reproducibility apparatus (see 5.4) and
 - light test apparatus (see 5.5);
- e) the results in accordance with this part of ISO 14145;
- f) any deviations from the specified procedures (see clauses 5 and 6); and
- g) the identification and signature of the tester.