INTERNATIONAL STANDARD

ISO 14145-1

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Roller ball pens and refills —

Part 1: General use

Stylos rollers et recharges —

Partie 1: Utilisation générale

Reference number
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Foreword

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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 document 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).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 10, *Technical product documentation*.

This second edition cancels and replaces the first edition (ISO 14145-1:1998), of which it constitutes a minor revision.

It also incorporates the Amendment ISO 14145-1:1998/Amd 1:2011.

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)*

Introduction

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

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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

ISO 534, *Paper and board — Determination of thickness, density and specific volume*

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

ISO 536, *Paper and board — Determination of grammage*

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

ISO 2144, *Paper, board and pulps — Determination of residue (ash) on ignition at 900 degrees C*

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

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

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

3 Terms and definitions

For the purposes of this document, 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 — Tip classification

Dimensions in millimetres

Tip classification (line width)	Tip code	Ball diameter
Extra fine	EF	Ø < 0,55
Fine	F	0,55 ≤ Ø < 0,75
Medium	M	0,75 ≤ Ø < 1,00
Broad	B	1,00 ≤ Ø

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.

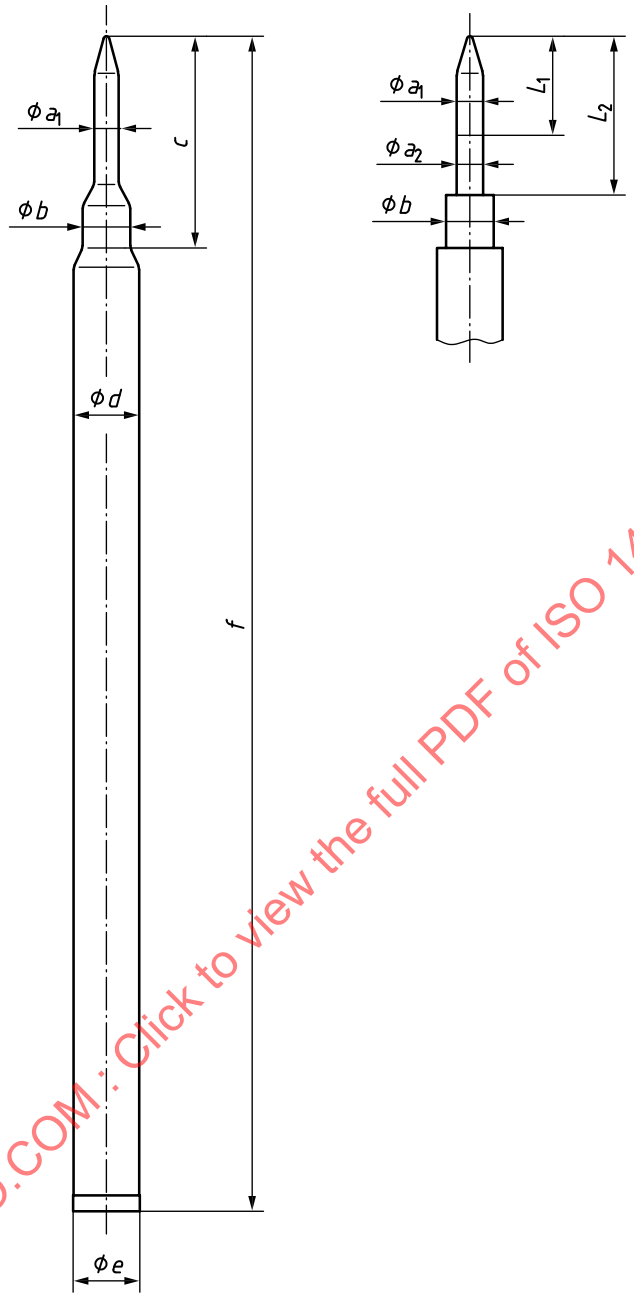

Figure 1 — Refill types A, B and C

Table 2 — Refill types A, B and C

Dimensions in millimetres

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

[a] Denotes a diameter of a tip holder.

[b] 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: $1\,^{0}_{-0,3}$ N;

b) writing angle: test write a sample at $60°\,^{+5°}_{0}$ and $70°\,^{0}_{-5°}$, determine at which angle the trace is most consistent and select this angle;

c) writing speed: 4,5 m/min ± 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

The performance testing paper shall conform to the specifications given in Table 3.

Table 3 — Testing paper

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

5.3 Eraser

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 (23 °C, 50 % relative humidity) or 27/65 (27 °C, 65 % relative humidity) and according to conditions at the place of testing. Ordinary tolerances (temperature ±2 °C, relative humidity ±5 %) are to be applied.

NOTE The resultant limits of relative humidity are therefore: (45 % to 55 %) and (60 % to 70 %).

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 the start and finish of the writing distance, examine for compliance with 4.3.1.

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.

