
**Mechanical pencils for technical
drawings —**

Part 1:
**Classification, dimensions,
performance requirements and testing**

Porte-mines pour le dessin technique —

Partie 1: Classification, dimensions, exigences de performance et essais



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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.

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 ISO documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 9177-1:2011), of which it constitutes a minor revision.

ISO 9177 consists of the following parts, under the general title *Mechanical pencils for technical drawings*:

- *Part 1: Classification, dimensions, performance requirements and testing*
- *Part 2: Black leads — Classification and dimensions*
- *Part 3: Black leads — Bending strengths of HB leads*

Mechanical pencils for technical drawings —

Part 1:

Classification, dimensions, performance requirements and testing

1 Scope

This part of ISO 9177 specifies classification, dimensions, performance requirements and testing for hand-held mechanical pencils used for technical drawings.

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

ISO 9177-2, *Mechanical pencils — Part 2: Black leads — Classification and dimensions*

3 Terms and definitions

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

3.1

mechanical pencil

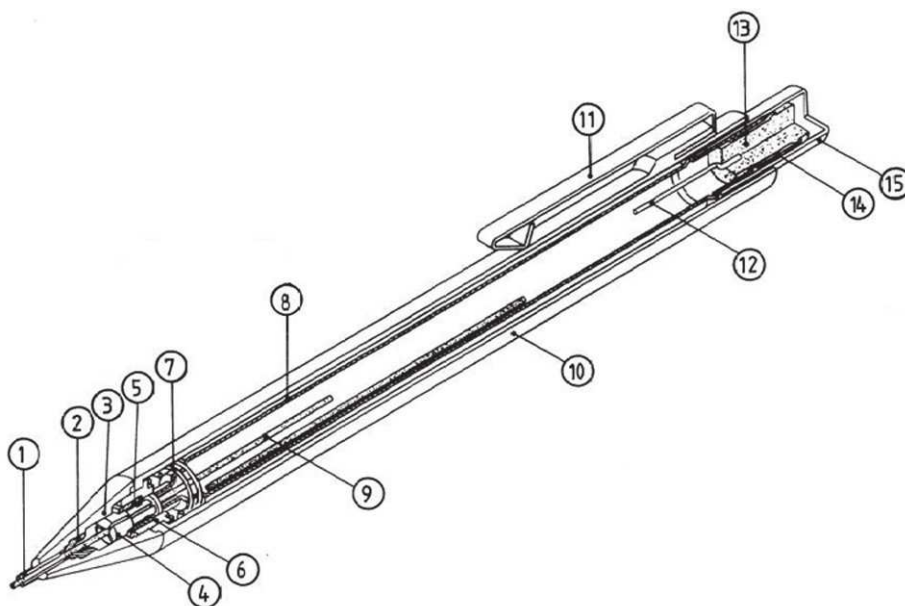
hand-held line-producing tool which holds and feeds out a lead, for technical drawings

4 Classification

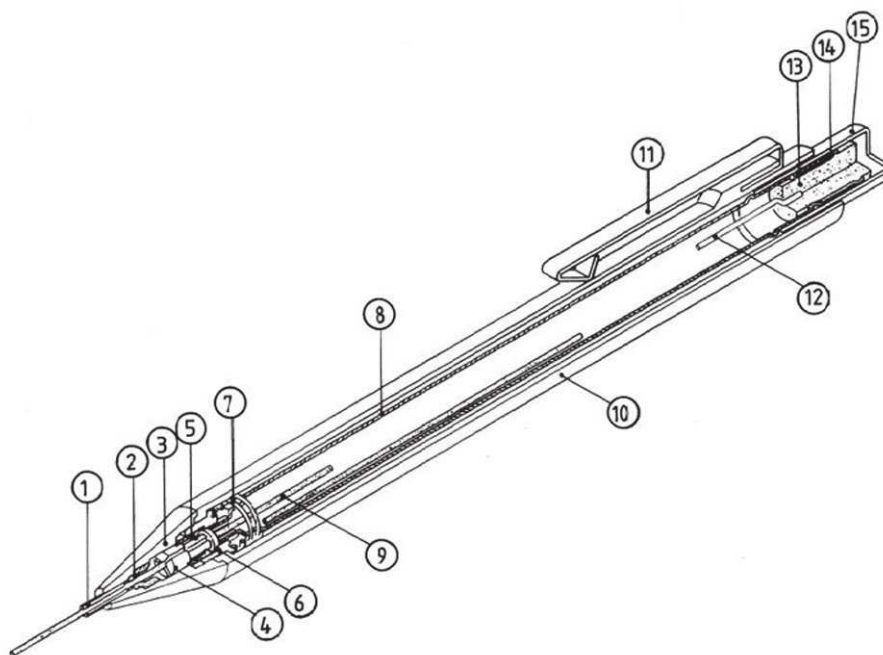
Mechanical pencils shall be classified according to the type of mechanism (see [Table 1](#)) and to the nominal diameter (see [Table 2](#)). For the classification and dimensions of the leads (diameter and length), see ISO 9177-2.

Table 1 — Classification according to type of mechanism

Mechanism	Type classification letter	Description	Relevant figure
Push-type	F ^a	Mechanical pencil in which the lead, housed in a barrel,	1
	L ^b	is fed out by actuating a push mechanism	2
Screw-type	S	Mechanical pencil in which the lead, housed in a barrel, is fed out by actuating a propelling screw mechanism	3
^a Mainly polymer leads having a nominal diameter of 0,35 to 1 mm. ^b Mainly ceramic leads having a nominal diameter of 2 mm (see ISO 9177-2).			



a) Lead in working position

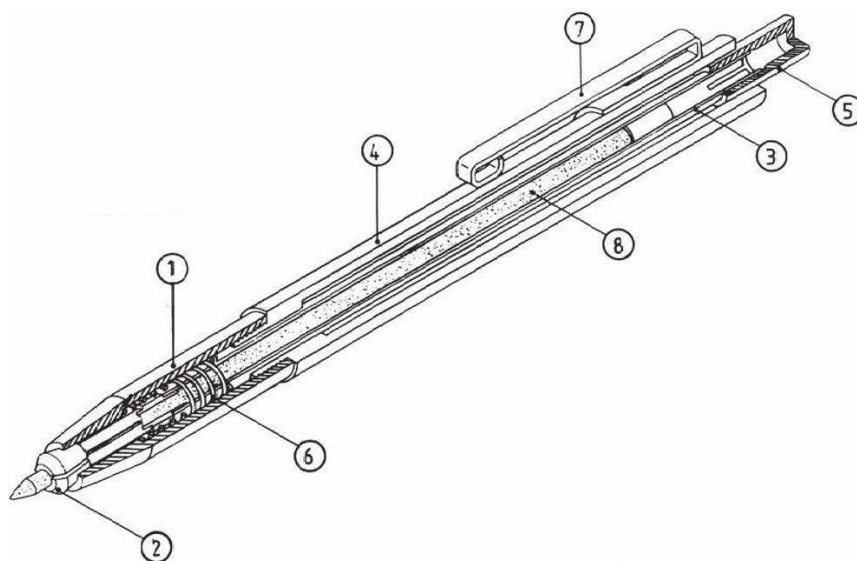


b) Lead in feeding position

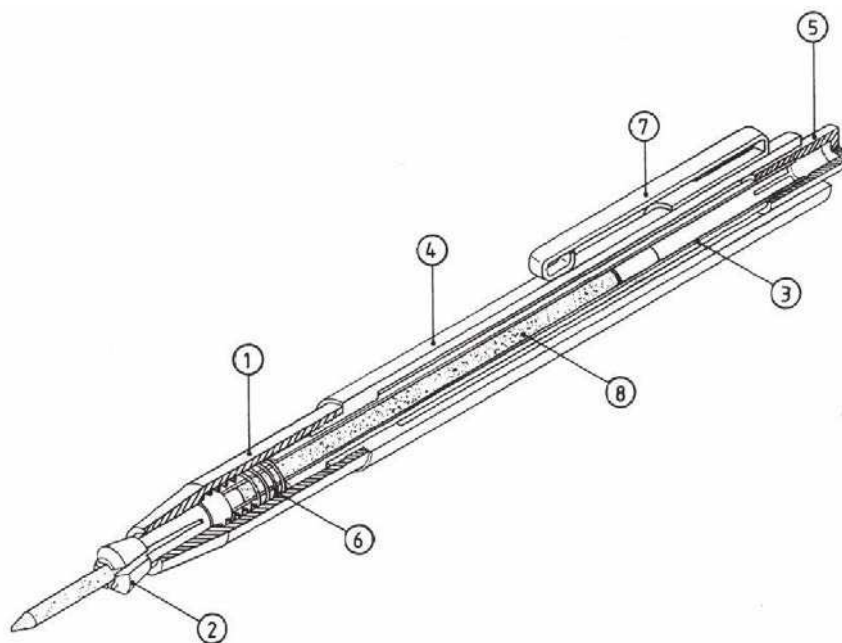
Key

1	guide pipe	6	nipple	11	clip
2	lead retainer	7	spring	12	cleaning pin
3	metal tip	8	lead tube	13	eraser
4	chuck	9	lead	14	eraser ferrule
5	chuck ring	10	barrel	15	push button

Figure 1 — Mechanical pencil of push-type F



a) Lead in working position

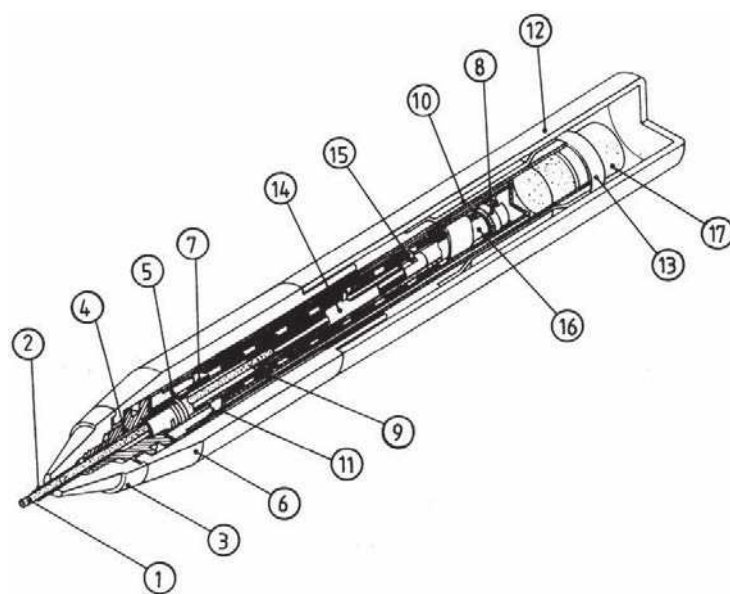


b) Lead in feeding position

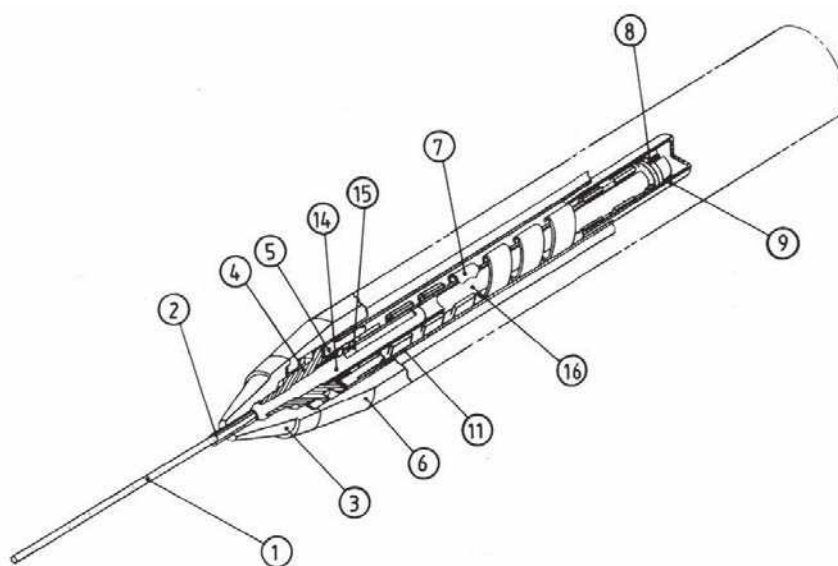
Key

- | | |
|-------------|---------------|
| 1 metal tip | 5 push button |
| 2 chuck | 6 spring |
| 3 lead tube | 7 clip |
| 4 barrel | 8 lead |

Figure 2 — Mechanical pencil of push-type L



a) Lead in working position



b) Lead in loading position

Key

- | | | | |
|---|--------------|----|------------------------|
| 1 | lead | 10 | sleeve holder |
| 2 | guide pipe | 11 | sleeve |
| 3 | metal tip | 12 | upper barrel |
| 4 | nipple | 13 | eraser ferrule |
| 5 | bushing | 14 | lead tube (with guide) |
| 6 | lower barrel | 15 | ejector |
| 7 | spiral | 16 | slit tube |
| 8 | spiral stop | 17 | eraser |
| 9 | spiral cover | | |

Figure 3 — Mechanical pencil of screw-type S

5 Dimensions

5.1 Nominal diameter

The nominal diameter of mechanical pencils, which corresponds to the nominal lead diameter, shall be as specified in [Table 2](#).

Table 2 — Nominal diameter

Dimensions in millimetres

Line thickness according to ISO 128-20	Leads diameter	
	Nominal diameter	Actual diameter and tolerance of the mechanical pencil lead (see ISO 9177-2)
0,35	0,35 ^a	0,35 $+0,04$ $+0,02$
0,5	0,5	0,5 $+0,08$ $+0,05$
0,7	0,7	0,7 $+0,03$ $-0,01$
1	1 ^a	1 $-0,08$ $-0,12$
2	2	2 $\pm 0,05$

^a Current practice is to label or mark mechanical pencils and boxes 0,3 and 0,9 as applicable. The user should note that leads with new standardized designations apply perfectly well to pencils with the old designations and vice versa, i.e. 0,35 and 1 correspond respectively to 0,3 and 0,9.

5.2 Bore size of guide pipe (mechanical pencils of push-type F and screw-type S)

The bore size of the guide pipe for mechanical pencils of push-type F and screw-type S shall be as specified in [Table 3](#). The bore refers to the inside diameter of the guide pipe through which the lead emerges.

The minimum length of the guide pipe shall be 3 mm.

Table 3 — Bore size of guide pipe (push-type F and screw-type S)

Dimensions in millimetres

Nominal diameter	Actual diameter and tolerance of bore of guide pipe
0,35	0,35 $+0,09$ $+0,05$
0,5	0,5 $+0,13$ $+0,09$
0,7	0,7 $+0,08$ $+0,04$
1	1 $-0,03$ $-0,07$

5.3 Outer diameter of guide pipe

The outer diameter of the guide pipe refers to the slot widths of templates and shall be as specified in [Table 4](#).

Table 4 — Outer diameter of guide pipe

Dimensions in millimetres

Nominal diameter	Outer diameter of guide pipe
0,35	0,84 ⁰ -0,03
0,5	0,95 ⁰ -0,03
0,7	1,12 ⁰ -0,04
1	1,3 ⁰ -0,04

6 Performance requirements

6.1 General

Mechanical pencils shall be tested for performance in accordance with [Clause 7](#) and shall satisfy the requirements specified in [6.2](#) or [6.3](#) as applicable.

6.2 Clamping force (mechanical pencils of push-types F and L)

Under the test conditions specified in [7.2](#), the lead shall neither retract into the guide pipe nor slide through the chuck clutching it.

6.3 Lead position relative to spiral clearance (mechanical pencils of screw-type S)

Under the test conditions specified in [7.3](#), the lead shall not retract by more than 0,7 mm.

7 Testing

7.1 General

Mechanical pencils shall be tested for the relative position of the lead with respect to the barrel when the mechanism is not actuated and when a force as specified in [7.2](#) or [7.3](#), as applicable, is applied.

7.2 Clamping force (mechanical pencils of push-types F and L)

Place the mechanical pencil vertically with the lead protruding by approximately 1 mm. Apply a vertical compressive load to the lead.

The vertical compressive load applied shall be 5 N for a nominal diameter of 0,35 mm and 8 N for a nominal diameter of 0,5 mm or over.

7.3 Lead position relative to spiral clearance (mechanical pencils of screw-type S)

Place the mechanical pencil vertically and rotate the barrel until the lead protrudes by not less than 2,5 mm. Then, by rotating in the opposite direction, retract the lead until it protrudes by 1,3 mm. Apply a vertical compressive load of 4 N to the lead.

8 Designation

The designation of mechanical pencils shall comprise, in the order given, the following elements:

- a) “mechanical pencil”;
- b) the number of this part of ISO 9177 (i.e. ISO 9177-1);
- c) the type classification letter (i.e. F, L or S); and
- d) the nominal diameter, in millimetres.

The designation shall be clearly indicated on the barrel of the mechanical pencil.¹⁾

Designation examples:

A mechanical pencil, of push-type F, complying with the requirements of this part of ISO 9177 and having a nominal diameter of 0,5 mm shall be designated as follows:

Mechanical pencil ISO 9177-1-F-0,5

A mechanical pencil, of push-type L, complying with the requirements of this part of ISO 9177 and having a nominal diameter of 2 mm shall be designated as follows:

Mechanical pencil ISO 9177-1-L-2

A mechanical pencil, of screw-type S, complying with the requirements of this part of ISO 9177 and having a nominal diameter of 0,7 mm shall be designated as follows:

Mechanical pencil ISO 9177-1-S-0,7

1) Where there is lack of space, only the number of this part of ISO 9177 (i.e. ISO 9177-1) should be shown.

