INTERNATIONAL STANDARD

ISO 20318-1

First edition
2019-02

Mechanical pencils and leads for general use — Classification, dimensions, quality and test methods —

Part 1: Mechanical pencils

Porte-mines et mines pour usage général — Classification, dimensions, qualité et méthodes d'essai —

Partie 1: Porte-mines

Reference number
ISO 20318-1:2019(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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 of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 10, *Technical product documentation*.

A list of all parts in the ISO 20318 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document was developed in response to the recent increase in popularity of mechanical pencils and their leads among students who use them for general writing, and where varieties of both hardness degrees and thickness (designated as marking diameter) of leads have been expanding in response to different types of usage. It should be noted that the entire production volume of mechanical pencils has been increasing every year, whereas the production of mechanical pencils for technical drawings has been decreasing.

Despite these recent trends, ISO 9177-1 was revised in 2011 with a scope limited to technical drawing usage only.

Therefore, it is clear that this document is necessary for general use and that it should be independent of technical drawings. The ISO 20318 series consists of two parts: mechanical pencils and black leads.

A set of a mechanical pencil and lead of the same marking diameter should be completely complementary, and should be compatible even with pencils and lead from different manufacturers.

It should also be noted that there are two issues which have not been resolved since the first relevant standard was published. First, on marking of labelling the diameters on mechanical pencils and cases of leads, two designations coexist: 0,35 and 0,3 and 1 and 0,9. This document attempts to clarify this designation issue by defining diameters precisely. Second, a scientific definition of hardness degree of leads is not yet available. Even though this document tried to establish a solely quantitative evaluation method, qualitative evaluation turned out to be inevitable. The issue, therefore, remains unresolved.

The title of the 2016 third edition of ISO 9177-1 was revised to distinguish it clearly from this document with the addition of “for technical drawings”.

Mechanical pencils and leads for general use — Classification, dimensions, quality and test methods —

Part 1: Mechanical pencils

1 Scope

This document specifies classification, dimensions, quality and test methods for hand-held mechanical pencilss which hold and feed out a lead, and are used for general writing. It is also applicable to multi-function pens equipped with a mechanical pencil unit. However, those pencils attached to machinery instruments such as a plotter are excluded.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20318-2, *Mechanical pencils for general use — Classification, dimensions, quality and test methods — Part 2: Black leads*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20318-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
mechanical pencil
writing instrument which holds and feeds out a lead

3.2
multi-function pen
writing instrument which can be equipped with two or more writing units (mechanical pencil unit and refills of gel ink ball pen or ball-point pen)

Note 1 to entry: At least one of these units is a mechanical pencil unit.

3.3
marking diameter
numerical symbol used for classification of mechanical pencils

Note 1 to entry: This corresponds to the classification of leads for mechanical pencils specified in ISO 20318-2.

3.4
nose cone
front part of a mechanical pencil

Note 1 to entry: Varieties include a nose cone without a guide pipe, a nose cone with a fixed guide pipe and a nose cone with a moving guide pipe.

Note 2 to entry: See Figures 1 and 2.

3.5
bore size
inside diameter of the guide pipe or a nose cone without a guide pipe, through which a lead emerges

3.6
residual length of lead
length of a lead remaining in a nose cone when approaching a state where writing is impossible as a result of dislocation of the lead from the chuck by pushing

4 Classification

4.1 General

Mechanical pencils shall be classified according to the type of mechanism (see Table 1 and Figures 1 and 2) and the marking diameter (see Table 2). The classification, quality, dimensions and test methods of the lead for mechanical pencils shall be in accordance with ISO 20318-2.

4.2 Type according to mechanism

The type according to mechanism shall be in accordance with Table 1.

Table 1 — Type according to mechanism

Mechanism	Type	Description	Relevant figure
Push-type	F	Mechanical pencil in which the lead, housed in a barrel, is fed out by a specified length by actuating a push mechanism	Figure 1
Mechanical pencil unit	M	Same as type F but equipped in a multi-function pen	Figure 2

4.3 Type according to marking diameter

The type according to marking diameter shall be in accordance with Table 2.

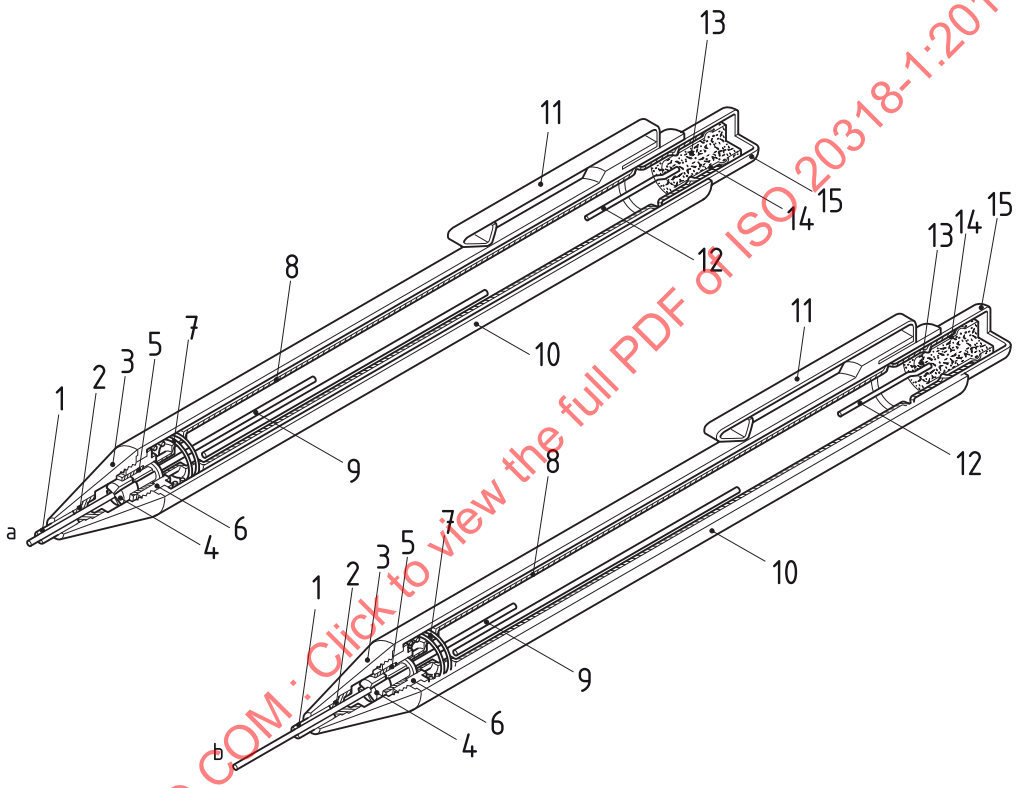
Table 2 — Type according to marking diameter

Dimensions in millimetres

Marking diameter for mechanical pencil	Diameter of ISO 20318-2		Informative	
	Marking diameter	Range of actual diameter	Nominal diameter according to ISO 9177-1 and ISO 9177-2	Line width according to ISO 128-20
0,2	0,2	0,27 to 0,29	—	0,25
0,3	0,3	0,37 to 0,39	0,35	0,35
0,4	0,4	0,46 to 0,48	—	—
0,5	0,5	0,55 to 0,58	0,5	0,5
0,7	0,7	0,69 to 0,73	0,7	0,7

Table 2 *(continued)*

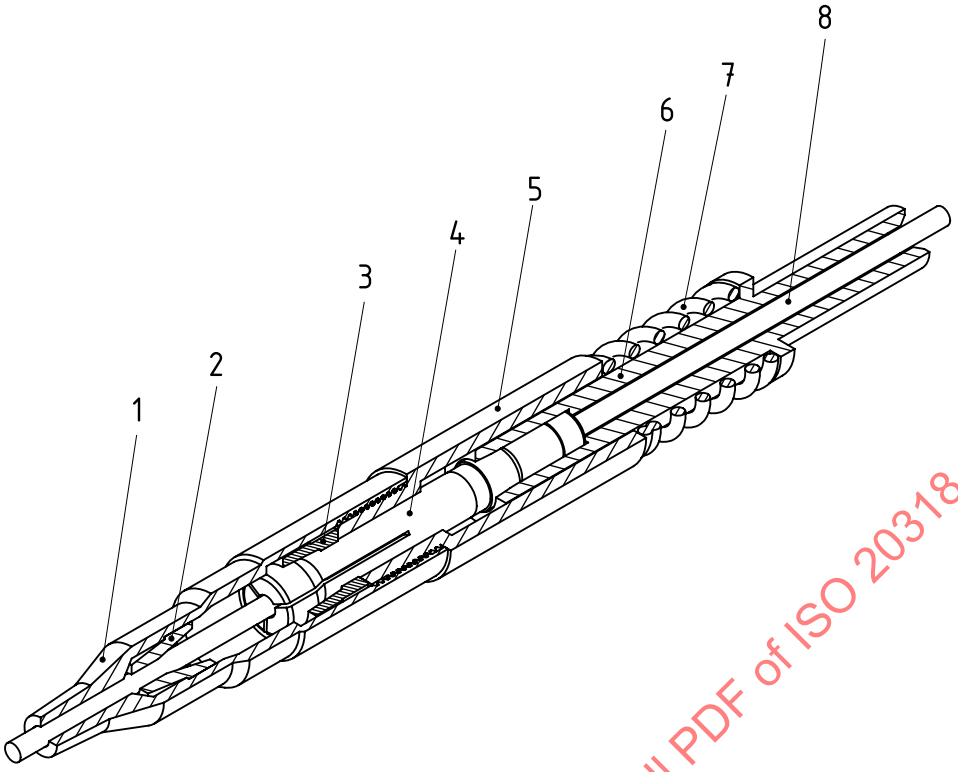
Marking diameter for mechanical pencil	Diameter of ISO 20318-2		Informative	
	Marking diameter	Range of actual diameter	Nominal diameter according to ISO 9177-1 and ISO 9177-2	Line width according to ISO 128-20
0,9	0,9	0,88 to 0,92	1	1
1,3	1,3	1,25 to 1,32	—	—
1,4	1,4	1,37 to 1,44	—	1,4
2	2	1,95 to 2,05	2	2



Key

1 guide pipe
2 lead retainer
3 nose cone
4 chuck
5 chuck ring
6 nipple
7 spring
8 lead tube
9 lead
10 barrel
11 clip
12 cleaning pin
13 eraser
14 eraser ferrule
15 push button
a Lead in working position.
b Lead in feeding position.

Figure 1 — Mechanical pencil of push-type F



Key

1	nose cone	5	nose cone receiver
2	lead retainer	6	joint
3	chuck ring	7	spring
4	chuck	8	lead

Figure 2 — Mechanical pencil unit; type M

5 Dimensions

5.1 Bore size

The bore size of nose cones made from metals of type F and M shall be within a respective bore value, as specified in Table 3, when measured in accordance with 7.2.

Table 3 — Bore size of nose cone made from metals

Dimensions in millimetres

Marking diameter for mechanical pencil	Range of actual diameter of bore of nose cone part	Range of actual diameter of the lead (see Table 2)
0,2	0,30 to 0,33	0,27 to 0,29
0,3	0,40 to 0,44	0,37 to 0,39
0,4	0,49 to 0,52	0,46 to 0,48
0,5	0,59 to 0,63	0,55 to 0,58
0,7	0,74 to 0,78	0,69 to 0,73
0,9	0,93 to 0,97	0,88 to 0,92

Table 3 *(continued)*

Marking diameter for mechanical pencil	Range of actual diameter of bore of nose cone part	Range of actual diameter of the lead (see Table 2)
1,3	1,33 to 1,38	1,25 to 1,32
1,4	1,45 to 1,51	1,37 to 1,44
2	2,06 to 2,13	1,95 to 2,05

The bore size of nose cones made from plastics of type F and M shall be within a respective bore size, as specified in Table 4, when measured in accordance with 7.2.

Table 4 — Bore size of nose cone made from plastics

Dimensions in millimetres

Marking diameter for mechanical pencil	Range of actual diameter of bore of nose cone part (*identical to Table 3)	Range of actual diameter of the lead (see Table 2)
0,2	0,30 to 0,33*	0,27 to 0,29
0,3	0,40 to 0,44*	0,37 to 0,39
0,4	0,49 to 0,52*	0,46 to 0,48
0,5	0,59 to 0,68	0,55 to 0,58
0,7	0,74 to 0,81	0,69 to 0,73
0,9	0,93 to 0,98	0,88 to 0,92
1,3	1,33 to 1,44	1,25 to 1,32
1,4	1,45 to 1,52	1,37 to 1,44
2	2,06 to 2,13*	1,95 to 2,05

6 Quality

6.1 Performance

The performance shall conform to the specifications of Table 5 when tested in accordance with 7.3 to 7.8.

Table 5 — Performance

Items	Performance	Testing articles
Operability	Operation shall be smooth. The second lead shall be consecutively projected followed by the first lead	7.3
Lead holdability (clamping force)	Lead shall not retract into the end face of nose cone	7.4
Residual length of lead[a]	Not longer than 15 mm	7.5
Tip load	Lead shall not be broken in four tests out of five	7.6
Shock resistance	Operation shall be free from abnormality	7.7
Durability	There shall be no abnormality in operating and lead holdability (clamping force)	7.8

[a] Not applicable to those of which the chuck is exposed.

7 Test methods

The test for mechanical pencils shall be as follows.

In the case of a mechanical pencil unit, it shall be tested on the state as equipped in a multi-function pen.

7.1 Test conditions

Unless otherwise specified, the test shall be carried out at the ordinary temperature (20 ± 15) °C and ordinary relative humidity (65 ± 20) %.

The leads to be used for the test shall be HB of lead for mechanical pencils specified in ISO 20318-2.

7.2 Bore size dimension

The bore size shall be measured with an instrument capable of measuring to an accuracy of 0,01 mm.

7.3 Operability

After loading leads into the lead tube, while holding the sample vertically with its nose cone downward, actuate the push mechanism. Examine whether a lead is fed out smoothly or not.

In the case of mechanical pencils storing two leads or more, examine whether the second lead is consecutively fed out followed by the first lead or not.

7.4 Lead holdability (clamping force)

While positioning the mechanical pencil vertically with a lead protruding more than 1 mm, apply a vertical compressive load to the lead as specified in Table 6. Examine whether the lead slips into the end of the nose cone or not.

Table 6 — Vertical compression load

Dimensions in newtons (N)

Marking diameter for mechanical pencil mm	Vertical compression load	
	Type F	Type M
0,2	3	—
0,3	5	4
0,4		
0,5	8	5
0,7		
0,9		
1,3		—
1,4		—
2		—

7.5 Residual length of lead

Insert the wire gauge specified in Table 7 into the chuck and retract until the end face of the nose cone, then remove the nose cone from the barrel. Measure the length from the end of the wire gauge to the end of the chuck, as shown in Figure 3. Wire gauges shall be rigidity substances suitable for measuring. For example, pin gauges or hardened rod.

In the case of mechanical pencils with a moving guide pipe alone with writing, retract the guide pipe at maximum, and then measure the length of the wire gauge as described above.

In the case of mechanical pencils with a fixed nose cone, insert the wire gauge until it reaches the closed chuck and then measure the depth of the inserted wire gauge.