SLOVENSKI STANDARD
SIST ISO 6906:1999

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Kljunasta pomiļ na merila z natanļ nostjo do 0,02 mm

Vernier callipers reading to 0,02 mm

Pieds à coulisse à vernier au 1/50 mm

Ta slovenski standard je istoveten z: **ISO 6906:1984**

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International Standard 6906

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6906 was developed by Technical Committee ISO/TC 3, *Limits and fits,* and was circulated to the member bodies in January 1983.

It has been approved by the member bodies of the following countries:

Australia	Hungary	Romania
Belgium	India	South Africa, Rep. of
Canada	Korea, Rep. of	Spain
China	Mexico	Switzerland
France	Netherlands	USA
Germany, F.R.	New Zealand	

The member bodies of the following countries expressed disapproval of the document on technical grounds:

Czechoslovakia	Poland
Italy	United Kingdom
Japan	

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Vernier callipers reading to 0,02 mm

1 Scope and field of application

This International Standard specifies the most important dimensional, functional and quality characteristics of vernier callipers reading to 0,02 mm, with a maximum range of 500 mm.

Methods for testing the accuracy of the instruments are given in the annex, for general information only.

NOTE — These vernier callipers are also commonly known as 1/50 mm vernier callipers.

Vernier callipers reading to 0,1 and 0,05 mm are dealt with in ISO 3599.

2 References

ISO 1, *Standard reference temperature for industrial length measurements.*

ISO 3599, *Vernier callipers reading to* 0,1 mm *and* 0,05 mm.

ISO 3650, *Gauge blocks.*

3 Terminology and definitions

3.1 Terminology

See figure 1.

3.2 Definitions

3.2.1 error in reading at any position of the sliding jaw: The difference between the actual distance separating the two measuring faces and the indicated value.

3.2.2 measuring range: The maximum distance that the jaws may be separated without the vernier scale projecting beyond the main scale.

4 Specifications

4.1 Measuring ranges

For recommended measuring ranges, see table 1.

4.2 Material

Vernier callipers shall be manufactured from either plain carbon steel or stainless steel, with a coefficient of thermal expansion in the temperature range 10 to 30 °C within the limits $(11{,}5 \pm 1{,}0) \times 10^{-6}\ K^{-1}$.

4.3 Hardness

The hardness shall be

a) for the beam, not less than 350 HV

b) for the measuring faces of the jaws:

— made of carbon steel, not less than 700 HV

— made of stainless steel, not less than 550 HV

4.4 Beam

The beam shall be long enough for the sliding jaw assembly not to overhang when measuring at the end of the measuring range.

4.5 Jaws

For the minimum projection of the jaws, J_{min}, see table 1.

The maximum projection of the jaws, J_{max}, shall be equal to one-third of the measuring range.

The minimum length of the faces for external measurement, L_{2min}, shall be one-half the projection of the jaws.

For the minimum length of internal measuring jaws, L_{1min}, see table 1.

The nominal combined width L_4 of the jaws for internal measurement shall be 5, 10 or 20 mm (see figure 2).

The faces for internal measurement shall be of cylindrical form with a radius not exceeding one-half of their combined width.

The slider shall be provided with a suitable clamp so that it may be effectively clamped to the beam without altering the position of the measuring faces by more than 10 µm.

The fit of the sliding jaw on the beam shall permit the various tolerances on measuring accuracy to be complied with under all conditions of normal use.

Table 1 — Measuring ranges and projections of jaws

Dimensions in millimetres

External measuring range	Minimum projection of jaws J_{min}	Minimum length of faces for internal measurement $L_{1\ min}$
150	30	4
200	40	6
250	50	6
300	50	6
400	55	8
500	55	8

4.6 Scales

The beam shall be graduated in millimetres and figured in millimetres or centimetres. The length of the scale shall be at least equal to the measuring range of the calliper plus the length of the vernier.

The length of the vernier scale, L_3, shall be 49 mm (see figure 1).

The scale lines of both the beam and the vernier shall be straight, sharp-edged and perpendicular to the edge of the beam, and their thickness shall be between 0,08 and 0,18 mm.

The distance between the graduated face of the beam and the edge of the graduated face of the vernier shall not exceed 0,3 mm (see figures 3 and 4).

NOTE — The beam and the slider may be provided with two scales, one for external measurement, the other for internal measurement and with direct reading for each scale.

5 Accuracy

5.1 Errors in reading

The maximum permissible errors in reading shall be calculated from the following formula:

$$e = \pm (20 + 0{,}05\ L)$$

where

e is the maximum permissible error in reading, in micrometres;

L is any measured length in millimetres within the measuring range.

The calculated values shall be rounded up to the nearest 10 µm.

NOTE — For convenience the definitive values appropriate to a specific measured length (L) are given in table 2.

Table 2 — Maximum permissible error in reading and maximum tolerance in parallelism of external measuring faces

Measured length L	Maximum permissible error in reading e	Maximum tolerance in parallelism of external measuring faces t
mm	µm	µm[1]
0	± 20	10
100	± 30	10
200	± 30	10
300	± 40	15
400	± 40	15
500	± 50	20

1) In the tolerance frame (see figure 1), these values are expressed in millimetres.

5.2 Measuring faces

5.2.1 Faces for external measurement

The faces for external measurement shall be flat to within 5 µm over their lengths.

They shall be parallel when the jaws are open and the slider clamped, within the parallelism tolerance (t), in micrometres, calculated from the following formula

$$t = \frac{e}{3}$$

where e is the maximum permissible error in reading, given in 5.1.

The calculated values shall be rounded up to the nearest 5 µm.

NOTE — For convenience the definitive values appropriate to a specific measured length (L) are given in table 2 (third column).

5.2.2 Faces for internal measurement

The faces for internal measurement shall be parallel to within 10 µm over their length.

In the case of vernier callipers with a single scale, the tolerance on the combined width L_4 (see 4.4) shall be $^{+10}_{\ \ 0}$ µm.

NOTE — This second requirement does not apply to vernier callipers having separate scales and vernier callipers which permit direct reading of internal and external measurements.

5.3 Jaws

The difference in the length J between the two jaws shall not exceed 30 µm. The same applies to the difference in the length J_1.

5.4 Scale lines

In any one instrument, the thickness of all scale lines shall not differ by more than 10 % of the mean thickness (i.e. a tolerance of ± 10 %).

The maximum permissible deviation of the thickness of two adjacent scale lines shall be 0,01 mm.

6 Marking

Vernier callipers shall be legibly marked with

a) the unit symbol of the scale figures on the beam (millimetres or centimetres);

b) the name of the manufacturer or a trademark, on the beam;

c) the indication "1/50 mm" or "0,02 mm" on the vernier.

d) furthermore:

— in the case of a single scale, the value for the nominal combined width of the jaws (L_4) for internal measurement shall be legibly marked on the jaws,

— in the case of double scales, the markings "Outside" and "Inside" shall be applied close to the corresponding vernier scales.

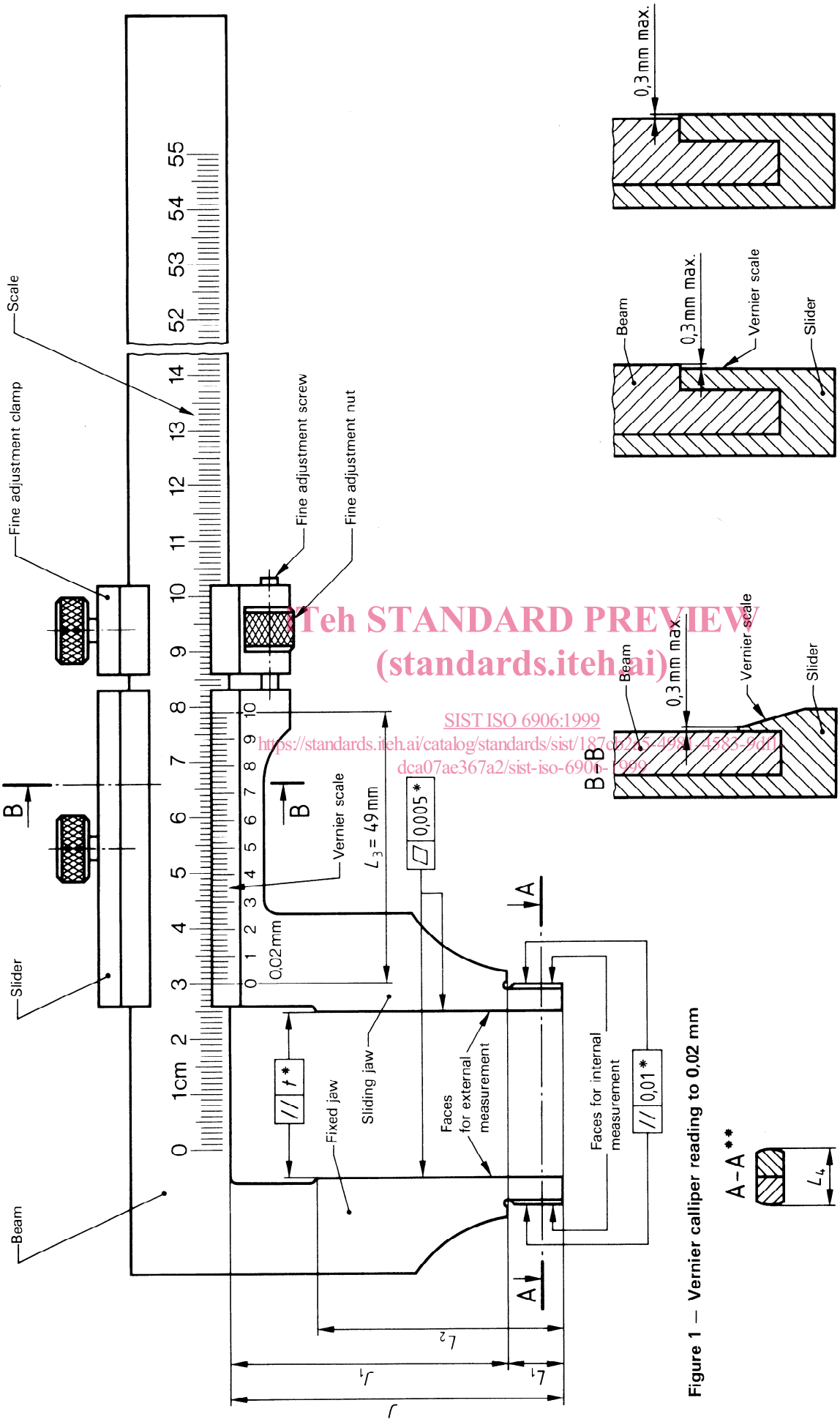

Figure 1 — Vernier calliper reading to 0,02 mm

Figure 2 — Combined width L_4 for internal measurement

Figure 3 — Slider with overlapping vernier scale

Figure 4 — Slider with abutting vernier scale

NOTE — The illustrations are diagrammatic only and are not intended to show details of design.

* Values in millimetres.

** Represented with closed jaws.