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Geometrical Product Specifications (GPS) — Dimensional measuring equipment — Design and metrological characteristics of mechanical dial gauges

Spécification géométrique des produits (GPS) — Instruments de mesurage dimensionnel: Comparateurs mécaniques à cadran — Caractéristiques de conception et caractéristiques métrologiques

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 463 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This first edition of ISO 463 cancels and replaces ISO/R 463:1965, which has been technically revised.

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Introduction

This International Standard is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences the chain link 5 of the chains of standards on size, distance, form of a line independent of datum, form of a line dependent of datum, form of a surface independent of datum, form of a surface independent of datum, orientation, location, circular run-out and total run-out in the general GPS matrix.

For more detailed information of the relation of the standard to other standards and the GPS matrix model see Annex D.

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Geometrical Product Specifications (GPS) — Dimensional measuring equipment — Design and metrological characteristics of mechanical dial gauges

1 Scope

This International Standard specifies the most important design and metrological characteristics of mechanical dial gauges.

2 Normative references

The following referenced documents are indispensable for the application 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 14253-1, *Geometrical Product Specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1: Decision rules for proving conformance or non-conformance with specifications*

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ISO/TS 14253-2, *Geometrical Product Specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 2: Guide to the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification*

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ISO 14978:—[1], *Geometrical Product Specification (GPS) — General concepts and requirement for GPS measuring equipment*

Guide to the expression of uncertainty in measurement (GUM). BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 1st edition, 1993, corrected and reprinted in 1995.

International Vocabulary of Basic and General Terms in Metrology (VIM). BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 2nd edition, 1993.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14253-1, ISO/TS 14253-2, ISO 14978, VIM and the following apply.

3.1
mechanical dial gauge
measuring instrument in which the axial displacements of a plunger are transmitted and magnified by suitable mechanical means to a pointer which rotates in front of an analog circular scale

NOTE It may also be provided with a revolution-counting device, e.g. in which a pointer rotates in front of a scale which indicates the number of revolutions of the pointer or the axial displacement of the plunger.

1) To be published.

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4 Design characteristics

4.1 General

The general design and workmanship shall be such that the performance of the dial gauge complies with the requirements of this International Standard unless otherwise specified by the manufacturer.

The design and rigidity of the dial gauge shall be such that the freedom of movement of the plunger is not impaired by clamping the stem of the instrument, providing that such clamping is applied to the minimum extent necessary to achieve a stable mounting. Where alternative methods of mounting are used, e.g. attaching the lug on the back plate, the design and rigidity of that mounting shall be such that the performance is not impaired.

4.2 Dimensions

The dial gauge shall conform to the dimensions specified in Figures 1, 2 and Table 1 to ensure interchangeability.

Table 1 — Main dimensions

Values in millimetres

Size classification	Bezel diameter D_1				
	30	40	60	80	100
Range of bezel diameter D_1 [a]	28 to 36	37 to 50	51 to 70	71 to 89	90 to 115
Stem diameter D_2	8 h6	8 h6	8 h6	8 h6	8 h6
Contact element outside diameter D_3	⩽ 7,5	⩽ 7,5	⩽ 7,5	⩽ 7,5	⩽ 7,5
Thread size D_4	M2,5-6H	M2,5-6H	M2,5-6H	M2,5-6H	M2,5-6H
Thread size D_5	M2,5-6g	M2,5-6g	M2,5-6g	M2,5-6g	M2,5-6g
Clamp diameter D_6 [b]	28 h6	28 h6	28 h6	28 h6	28 h6
Stem length L_1	⩾ 8,5	⩾ 10	⩾ 12	⩾ 15,5	⩾ 9,5
Length L_2 [c]	⩽ 12	⩽ 28	⩽ 34	[d]	[d]
Thread length L_3	⩽ 5	⩽ 5	⩽ 5	⩽ 5	⩽ 5
Thread length L_4	⩾ 6	⩾ 6	⩾ 6	⩾ 6	⩾ 6
Contact distance, centreline to back, L_5	⩽ 10	⩽ 10	⩽ 10	⩽ 10	⩽ 10

[a] Actual bezel diameter equals width.
[b] The clamp diameter D_6 is optional.
[c] Plunger pressed in.
[d] Depending on the measuring range.

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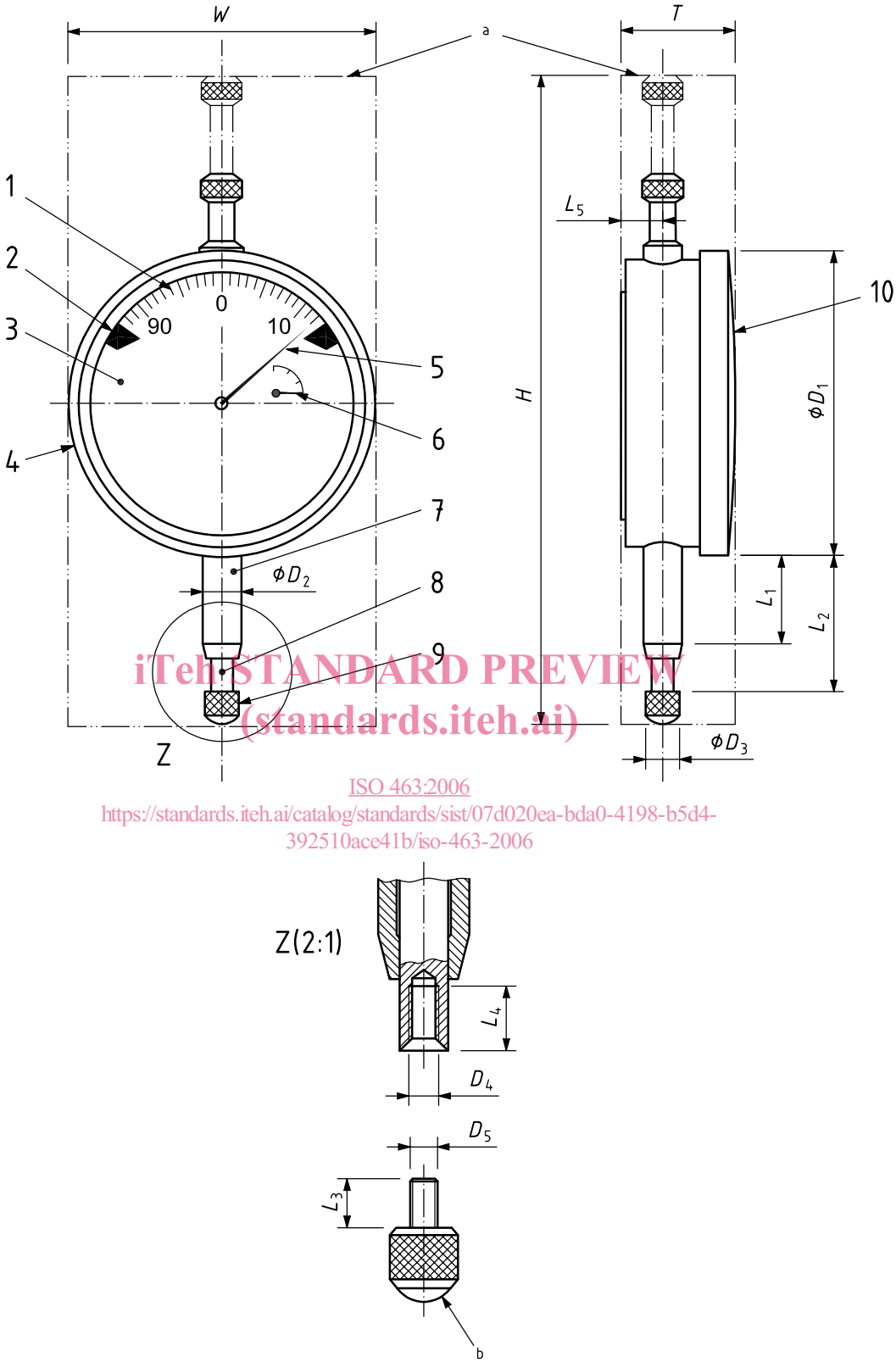

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Key

1	scale	4	bezel	7	stem	10	dial cover
2	limit indicator	5	pointer	8	plunger	a	Maximum required space.
3	dial	6	revolution counting device	9	contact element	b	Measuring face.

Figure 1 — Nomenclature and general design of dial gauge

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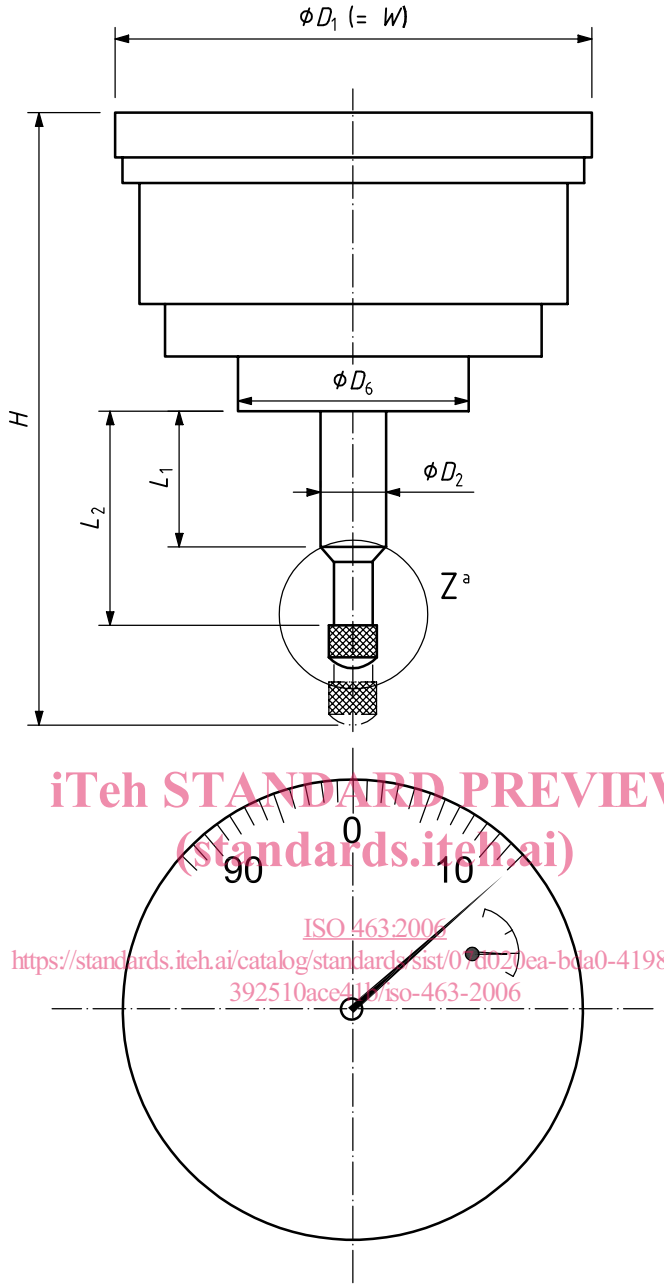

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[a] See Figure 1.

Figure 2 — Nomenclature and general design of dial gauge with plunger at rear

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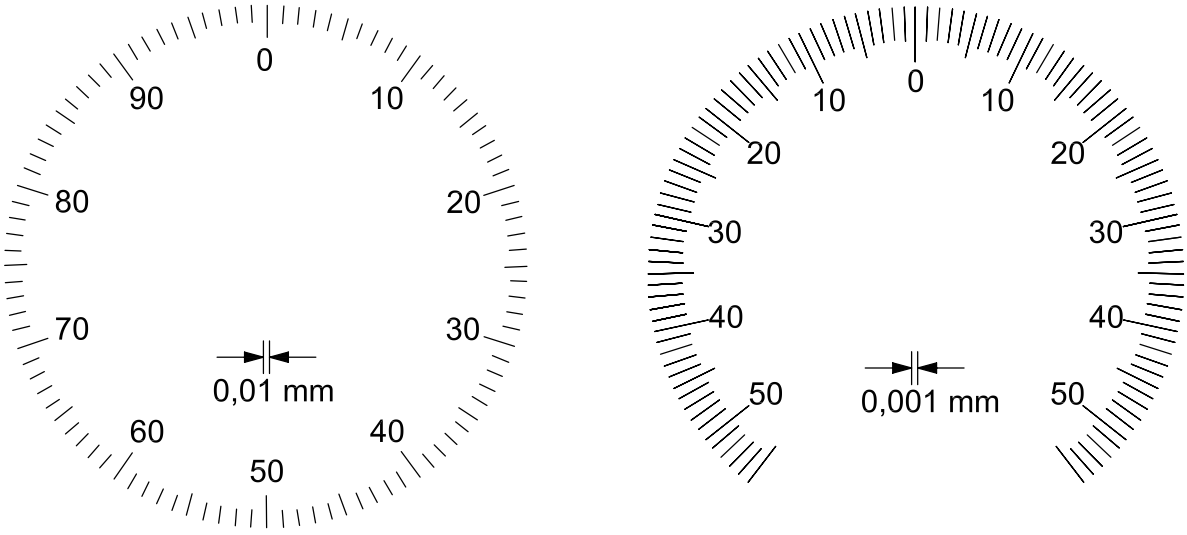
4.3 Dial and pointer

The circular scale shall be graduated in scale intervals. The scale interval and its unit shall be clearly identified. Two examples of scale layouts are shown in Figure 3 (scale interval: 0,01 mm, 0,001 mm).



a) Scale for multiple revolutions b) Scale for partial revolution

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Figure 3 — Examples of scale layouts

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The pointer shall move in a clockwise direction when the plunger is pressed into the gauge.

For dial gauges with more than one pointer revolution [dial layout according to Figure 3 a)]:

— When the long pointer is in the position of rest and the zero mark on the dial is at 12 o'clock, the pointer shall lie at least 1/10th of the scale range in an anticlockwise position (pre-span). Travel beyond the measuring range (post-span) shall be not less than 1/10th of the scale range [see Figure 4 a)].

For dial gauges with less than one pointer revolution [dial layout according to Figure 3 b)]:

— When the plunger is in the position of rest, the pointer shall lie at least 3 scale intervals in an anticlockwise position (pre-span). The post-span (travel beyond the measuring range) shall be such that the pointer does not reach the position which it has in the position of rest. But the post-span shall be at least 3 scale intervals [see Figure 4 b)].

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