
**Technical drawings — Indication of
dimensions and tolerances —**

**Part 1:
General principles**

*Dessins techniques — Indication des cotes et tolérances —
Partie 1: Principes généraux*
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Published in Switzerland

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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 129-1 was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 1, *Basic conventions*.

This part of ISO 129, together with ISO 129-2, cancels and replaces ISO 129:1985 and ISO 406:1987 of which it constitutes a technical revision. (standards.iteh.ai)

ISO 129 consists of the following parts, under the general title *Technical drawings — Indication of dimensions and tolerances*:

— Part 1: *General principles*

— Part 2: *Mechanical engineering*

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Technical drawings — Indication of dimensions and tolerances —

Part 1: General principles

1 Scope

This part of ISO 129 establishes the general principles of dimensioning applicable for all types of technical drawings.

NOTE The figures in this part of ISO 129 merely illustrate the text and are not intended to reflect actual usage. Consequently, they have been simplified to indicate only the relevant general principles applicable in any technical area.

Additional and more specific rules and details about the use of dimensioning for construction engineering are given in ISO 6284. For mechanical engineering, they will be given in the future ISO 129-2.

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 128-20:1996, *Technical drawings — General principles of presentation — Part 20: Basic conventions for lines*

ISO 128-22:1999, *Technical drawings — General principles of presentation — Part 22: Basic conventions and applications for leader lines and reference lines*

ISO 128-30:2001, *Technical drawings — General principles of presentation — Part 30: Basic conventions for views*

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*

ISO 3098-0:1997, *Technical product documentation — Lettering — Part 0: General requirements*

ISO 3098-5:1997, *Technical product documentation — Lettering — Part 5: CAD lettering of the Latin alphabet, numerals and marks*

ISO 6284:1996, *Construction drawings — Indication of limit deviations*

ISO 6412-2:1989, *Technical drawings — Simplified representation of pipelines — Part 2: Isometric projection*

ISO 6428:1982, *Technical drawings — Requirements for microcopying*

ISO 10209-2:1993, *Technical product documentation — Vocabulary — Part 2: Terms relating to projection methods*

ISO/IEC 81714-1, *Design of graphical symbols for use in the technical documentation of products — Part 1: Basic rules*

3 Terms and definitions

For the purposes of this part of ISO 129, the following terms and definitions apply.

3.1 Features

3.1.1

geometrical feature

point, line or surface

[ISO 14660-1:1999, definition 2.1]

NOTE The word geometrical may be deleted if no risk of misunderstanding occurs, hence, in this standard the word “feature” will be used alone.

3.1.2

feature of size

geometrical shape defined by a linear or angular dimension which is a size

[ISO 14660-1:1999, definition 2.2]

NOTE 1 The feature of size can be a cylinder, a sphere, two parallel opposite surfaces, a cone or a wedge.

NOTE 2 In International Standards such as ISO 286-1 and ISO/R 1938-1, the meanings of the terms “plain workpiece” and “single features” are close to that of “feature of size”.

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3.1.3

reference feature

feature which is used as the origin for the determination of another feature

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3.1.4

repeated feature

periodicity of features of the same spacing or angle referred to one or more reference features

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3.2 Lines of dimensioning

3.2.1

centre line

line on a drawing indicating the geometrical centre of the represented feature(s)

3.2.2

dimension line

straight or curved line on a drawing between two features, or between a feature and an extension line, or between two extension lines indicating the dimension graphically

NOTE The dimensional value and any tolerance indication are attached to the dimension line.

3.2.3

extension line

line connecting the feature(s) to be dimensioned and the ends of the corresponding dimension line

3.2.4

leader line

line connecting information or requirements or a reference line with a feature or a dimension line

NOTE Adapted from ISO 128-22:1999.

3.2.5**line of symmetry**

straight line on a drawing indicating the plane or axis of symmetry

3.2.6**origin circle**

starting point of running dimensioning or coordinate dimensioning

3.2.7**terminator**

indication signifying the extremities of a dimension or leader line

3.3 Dimensions**3.3.1****dimension**

distance between two features or the size of a feature of size

NOTE Linear and angular dimensions exist.

3.3.2**basic dimension****dimensional value**

numerical value of a dimension expressed in a specific unit and indicated on drawings with lines and relevant symbols

NOTE 1 When no tolerance is indicated, the basic dimension is often called the dimensional value.

NOTE 2 Unit of dimension should be linear or angular.

NOTE 3 The tolerance limits and/or permissible deviations are applied to the basic dimension.

3.3.3**linear dimension**

linear distance between two features or the linear size of a feature of size

NOTE In mechanical engineering drawings, linear dimensions are classified in size, distances and radii (ISO/TR 14638).

3.3.4**angular dimension**

the angle between two features or the angle of an angular feature of size

NOTE In mechanical engineering drawings, angular dimensions are classified in angular size and angular distances (ISO/TR 14638).

3.3.5**tolerance of dimension**

difference between the upper and lower tolerance limits of a dimension

3.3.6**auxiliary dimension**

dimensions derived from other dimensions given for information purposes only

3.4 Arrangement of dimensions**3.4.1****chain dimensioning**

method of dimensioning where single dimensions are arranged in a row

3.4.2

coordinate dimensioning

method of dimensioning from a reference feature in a coordinate system

EXAMPLE Cartesian or polar coordinates, see ISO 10209-2.

3.4.3

parallel dimensioning

method of dimensioning from a reference feature with parallel or concentric dimension lines

3.4.4

running dimensioning

method of dimensioning from a reference feature where each feature is dimensioned

3.4.5

tabular dimensioning

method of dimensioning where features and/or dimensions are indicated by allocated numbers or letters and recorded in tables

4 Principles of dimensioning and of indication of tolerances

4.1 General principles

All dimensions, graphical symbols and annotations shall be indicated such that they can be read from the bottom or right-hand side (main reading directions) of the drawing.

Dimensions are one of several types of geometrical requirements, which may be used to define a feature or component clearly and unambiguously. Other types of geometrical requirements, which most often are needed to obtain an unambiguous definition of the feature (e.g. in mechanical engineering) are geometrical tolerances (form, orientation, location and run-out), surface texture requirements and requirements for corners.

NOTE In the construction engineering, tolerances are often given in separate documents.

All dimensional information shall be complete and shown directly on a drawing unless this information is specified in related associated documentation.

Each feature or relation between features shall be dimensioned only once.

Where all linear dimensions are expressed in the same unit, the unit symbol may be omitted, provided the drawing or associated documentation carries a statement of the unit used.

4.2 Positioning of dimensions

Dimensions should be placed on that view or section which shows the relevant feature(s) most clearly (see Figure 1).

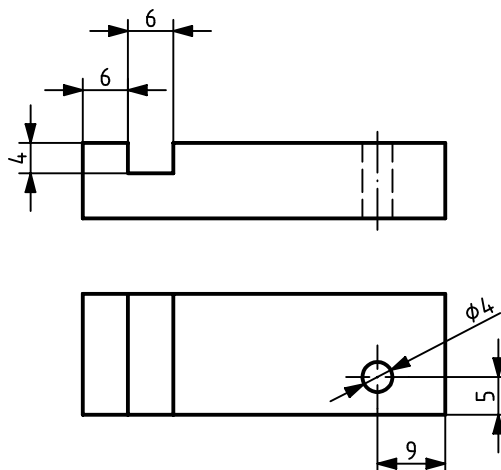


Figure 1

Where several features or objects are depicted in close proximity, their relative dimensions should be grouped, together, separately, for ease of reading (see Figure 2).

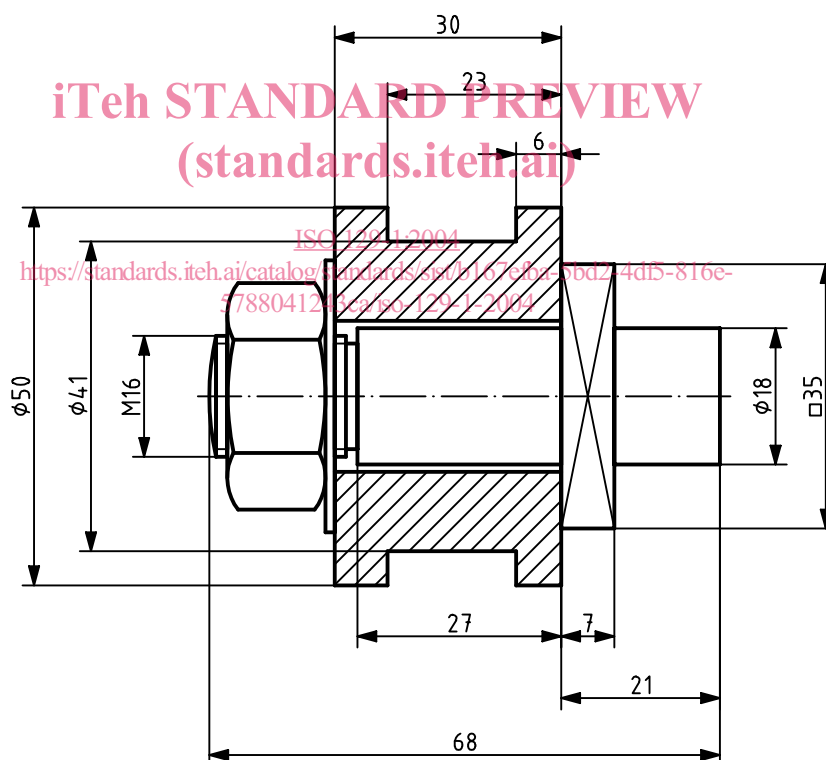


Figure 2

4.3 Units of dimensions

Dimensions shall be indicated using only one unit of dimension. Where a variety of units of dimension are used within one document, they shall be clearly indicated.

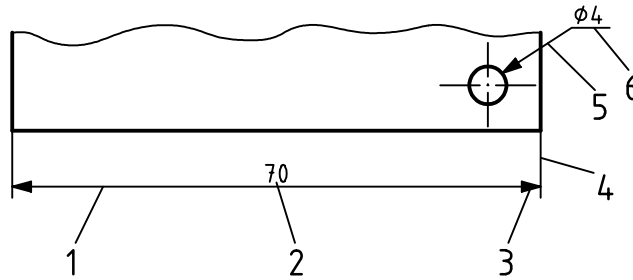
For dimensions, SI units shall be used; see ISO 1000 or other International Standards relevant for SI units.

Limit deviations shall be expressed in the same unit as the basic dimension.

5 Elements of dimensioning

5.1 General

The elements of dimensioning are extension lines, dimension lines, leader lines, terminators, indication of origins and dimensional values (basic dimensions). Various elements of dimensioning are illustrated in Figure 3; the origin circle is indicated in Figures 62 to 64.



Key

- 1 dimension line
- 2 dimensional value
- 3 terminator (in this case, an arrowhead)
- 4 extension line
- 5 leader line
- 6 reference line

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Figure 3

5.2 Dimension line

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Dimension lines shall be drawn with a continuous narrow line according to ISO 128-20.

Dimension lines shall be indicated in the case of

- linear dimensions parallel to the length to be dimensioned (see Figure 4),
- angular dimensions or dimensions of an arc as a circular arc around the vertex of the angle or the centre of the arc (see Figures 5 and 6), and
- radii generated from the geometrical centre of the radius (see Figure 6).

Where space is limited, dimension lines may be indicated with extensions and reversed arrowheads (see Figure 1).

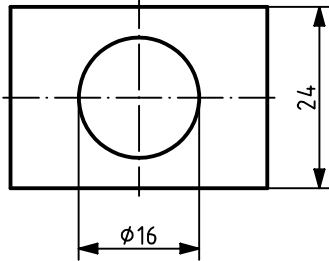


Figure 4

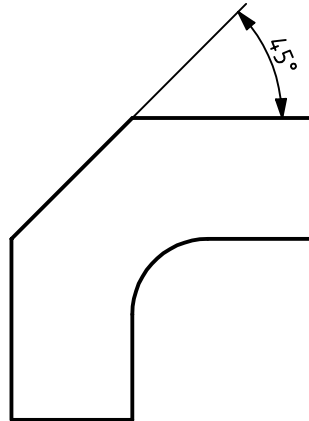


Figure 5

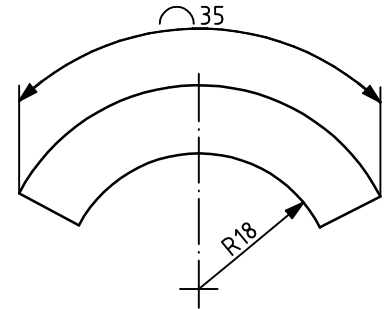


Figure 6

Where the feature is shown broken, the corresponding dimension line shall be shown unbroken (see Figure 7).



Figure 7

Intersection of dimension lines with any other line should be avoided, but where intersection is unavoidable they shall be shown without a break (see Figure 8).

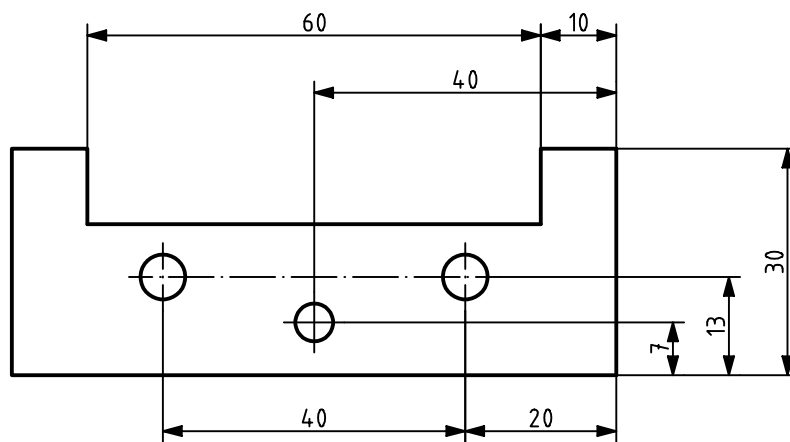
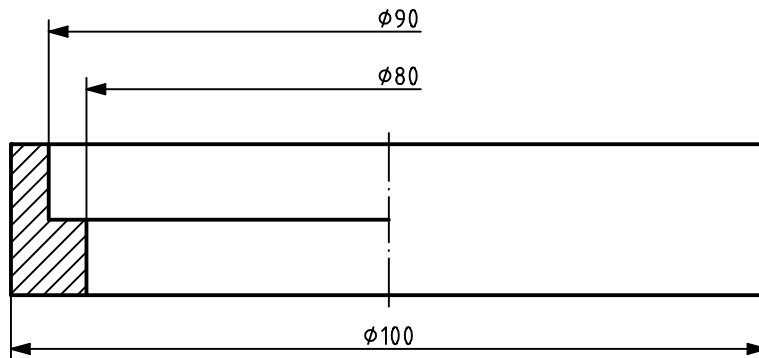


Figure 8

Dimension lines may be shown not in full, when

- dimensions of diameters are indicated (see Figure 9),
- only a part of a symmetrical feature is drawn in a view or section (see Figures 55 and 56),
- a feature is drawn half in a view and half in a cut (see Figure 9),
- the reference feature for dimensioning is not on the drawing sheet and there is no need for its indication (see Figure 40 R62),
- referring to grids on construction drawings (see Figure 10).



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Figure 9

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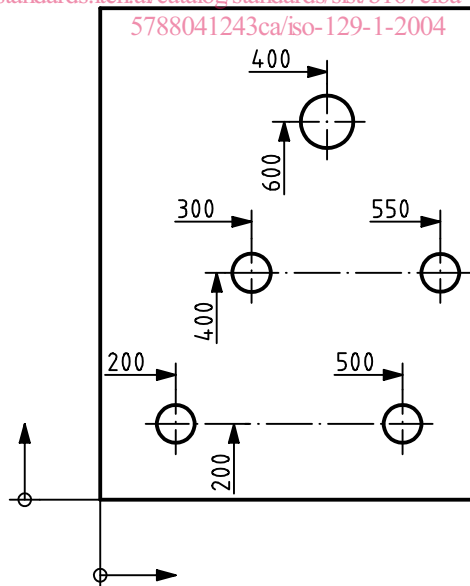


Figure 10