SLOVENSKI STANDARD
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Tehnične risbe - Temeljni principi toleriranja

Technical drawings -- Fundamental tolerancing principle

Dessins techniques -- Principe de tolérancement de base

Ta slovenski standard je istoveten z: **ISO 8015:1985**

ICS:

01.100.20	Konstrukcijske risbe	Mechanical engineering drawings

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International Standard ISO 8015

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION●МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ●ORGANISATION INTERNATIONALE DE NORMALISATION

Technical drawings — Fundamental tolerancing principle

Dessins techniques — Principe de tolérancement de base

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ISO 8015-1985 (E)

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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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8015 was prepared by Technical Committee ISO/TC 10, *Technical drawings*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Technical drawings — Fundamental tolerancing principle

1 Scope

This International Standard specifies the principle of the relationship between dimensional (linear and angular) tolerances and geometrical tolerances.

2 Field of application

The specified principle shall be applied on technical drawings and related technical documents to

— linear dimensions and their tolerances;

— angular dimensions and their tolerances;

— geometrical tolerances;

which define the following four aspects for each feature of the part:

— size;

— form;

— orientation;

— location.

3 References

ISO 286/1, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits.* [1)]

ISO 1101, *Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings.*

ISO 2692, *Technical drawings — Geometrical tolerancing — Maximum material principle.* [2)]

4 Principle of independency

Each specified dimensional or geometrical requirement on a drawing shall be met independently, unless a particular relationship is specified.

Therefore, where no relationship is specified, the geometrical tolerance applies regardless of feature size, and the two requirements are treated as being unrelated.

Consequently, if a particular relationship of

— size and form, or

— size and orientation, or

— size and location

is required, it shall be specified on the drawing (see clause 6).

5 Tolerances

5.1 Dimensional tolerances

5.1.1 Linear tolerances

A linear tolerance controls only the actual local sizes (two-point measurements) of a feature, but not its form deviations (for example circularity and straightness deviations of a cylindrical feature or flatness deviations of two parallel plane surfaces). (See ISO 286/1.)

Form deviations shall, however, be controlled by the following:

— individually indicated form tolerances;

— general geometrical tolerances;

— envelope requirement.

NOTE — For the purposes of this International Standard, a single feature consists of a cylindrical surface or two parallel plane surfaces.

There is no control of the geometrical interrelationship of individual features by the linear tolerances. For example, the perpendicularity of the sides of a cube is not controlled and, therefore, it requires a perpendicularity tolerance dictated by the design requirement.

1) At present at the stage of draft. (Revision of ISO/R 286-1962.)

2) At present at the stage of draft. (Revision of ISO 1101/2-1974.)

5.1.2 Angular tolerances

An angular tolerance, specified in angular units, controls only the general orientation of lines or line elements of surfaces, but not their form deviations (see figure 1).

The general orientation of the line derived from the actual surface is the orientation of the contacting line of ideal geometrical form (see figure 1). The maximum distance between the contacting line and the actual line shall be the least possible value.

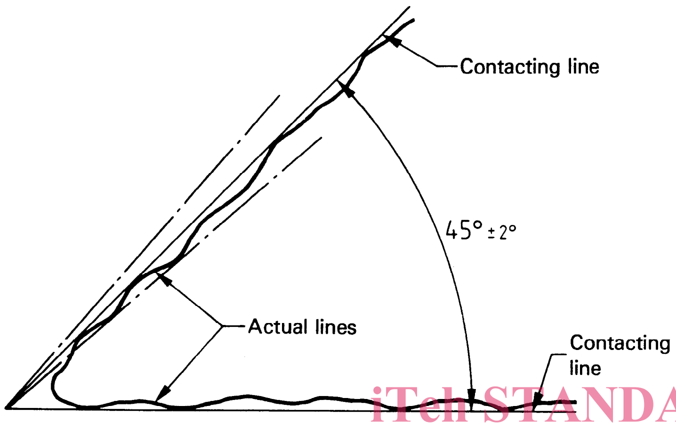


Figure 1

Form deviations shall, however, be controlled by the following:

- individually indicated form tolerances;
- general geometrical tolerances.

5.2 Geometrical tolerances

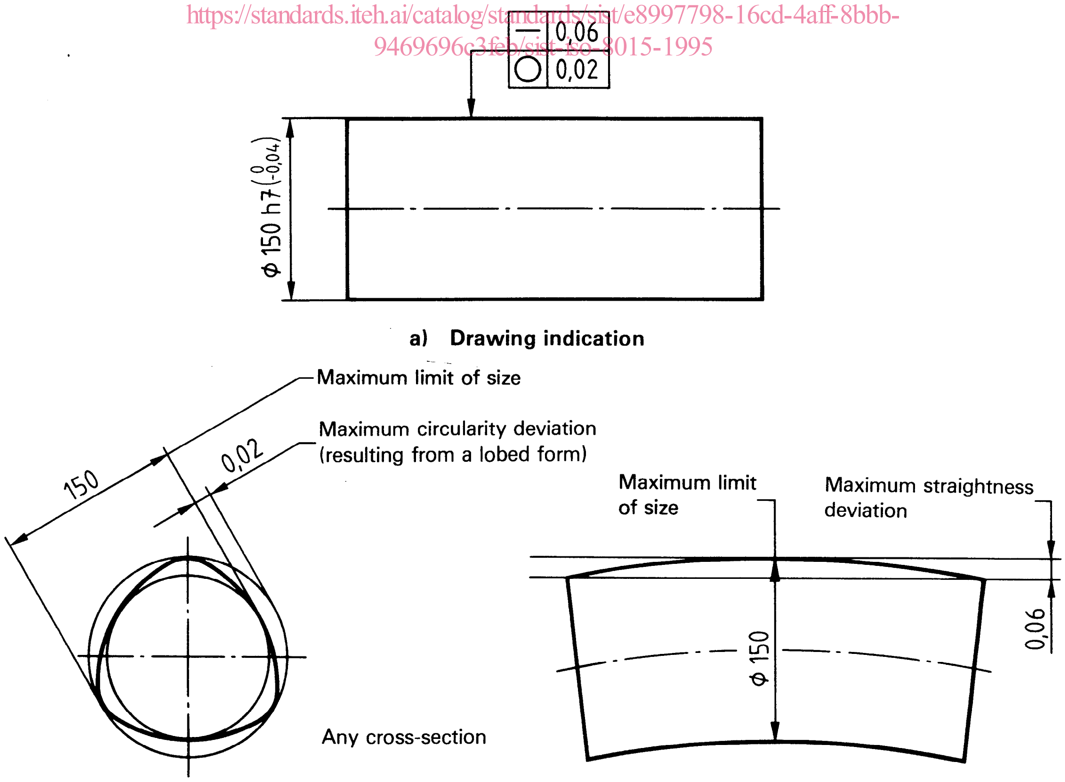
Geometrical tolerances control the deviation of the feature from its theoretically exact

- form, or
- orientation, or
- location

regardless of the feature size.

The geometrical tolerances will, therefore, apply independently of the actual local sizes of individual features (see clause 4). The geometrical deviations may be at a maximum whether or not the cross-sections of the respective features are at maximum material size.

For instance, a shaft with maximum material size at any cross-section may have a lobed form deviation within the circularity tolerance, and may also be bent by the amount of the straightness tolerance [see figures 2a) and 2b)].



a) Drawing indication

b) Interpretation

Figure 2

6 Mutual dependency of size and geometry

Mutual dependency of size and geometry may be called for by

- the envelope requirement (see 6.1);
- the maximum material principle (see 6.2).

6.1 Envelope requirement

For a single feature, either a cylindrical surface or a feature established by two parallel plane surfaces (feature of size), the envelope requirement may be applied. The requirement means that the envelope of perfect form at maximum material size of the feature shall not be violated.

The envelope requirement may be indicated either

- by the symbol Ⓔ placed after the linear tolerance [see figure 3a)], or
- by reference to an appropriate standard which invokes the envelope requirement.

Example: Envelope requirement applied to a cylindrical feature

a) Drawing indication

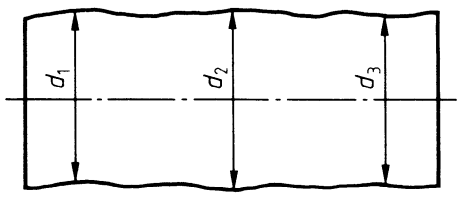
Figure 3a)

b) Functional requirements:

- The surface of the cylindrical feature shall not extend beyond the envelope of perfect form at maximum material size of ø 150.
- No actual local size shall be less than ø 149,96.

This means that the actual part shall meet the following requirements:

- each actual local diameter of the shaft shall remain within the size tolerance of 0,04 and, therefore, may vary between ø 150 and ø 149,96 [see figure 3b)];



d_1, d_2, d_3: actual local diameters

Figure 3b)

— the entire shaft shall remain within the boundary of the envelope cylinder of perfect form and of ø 150 [see figures 3c) and 3d)].

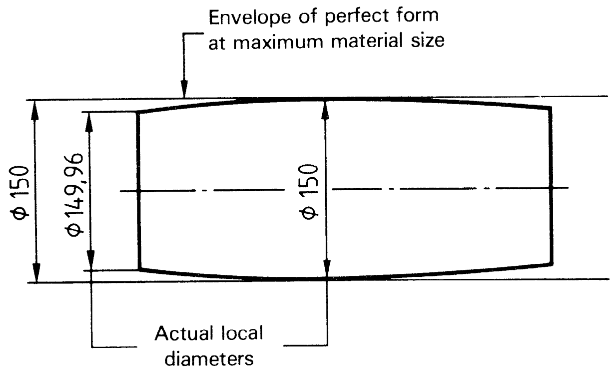


Figure 3c)

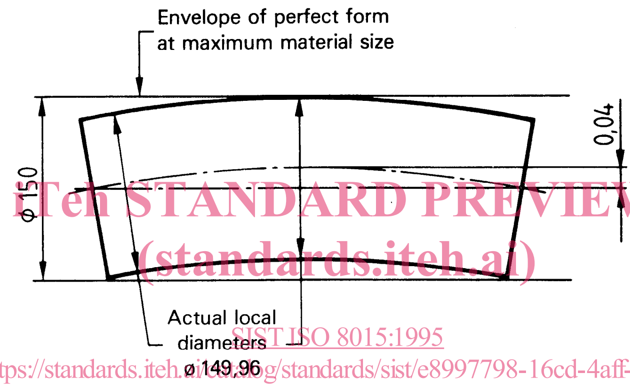


Figure 3d)

Hence it follows that the shaft shall be exactly cylindrical when all actual local diameters are at the maximum material size of ø 150 [see figure 3e)].

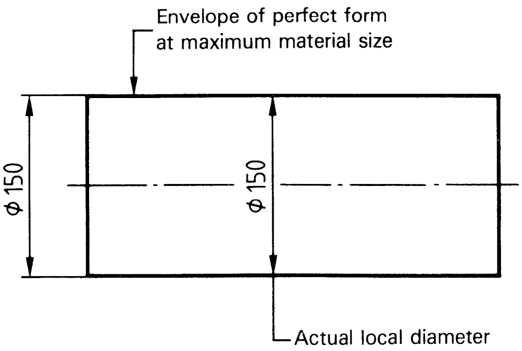


Figure 3e)