International Standard 406

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

Technical drawings — Linear and angular tolerancing — Indications on drawings

Dessins techniques — Tolérancement linéaire et angulaire — Indications sur les dessins

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Foreword

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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 406 was developed by Technical Committee ISO/TC 10, *Technical drawings*, and was circulated to the member bodies in August 1981.

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

Australia	France	Poland
Austria	Germany, F. R.	Romania
Belgium	Hungary	South Africa, Rep. of
Canada	India	Spain
China	Italy	Sweden
Czechoslovakia	Japan	Switzerland
Denmark	Korea, Rep. of	USA
Egypt, Arab Rep. of	New Zealand	USSR
Finland	Norway	

The member body of the following country expressed disapproval of the document on technical grounds :

United Kingdom

This International Standard cancels and replaces ISO Recommendation R 406-1964, of which it constitutes an updated version.

Technical drawings — Linear and angular tolerancing — Indications on drawings

1 Scope and field of application

This International Standard specifies the indications of linear and angular tolerances on technical drawings.

Indicating such tolerances does not necessarily imply the use of any particular method of production, measurement or gauging.

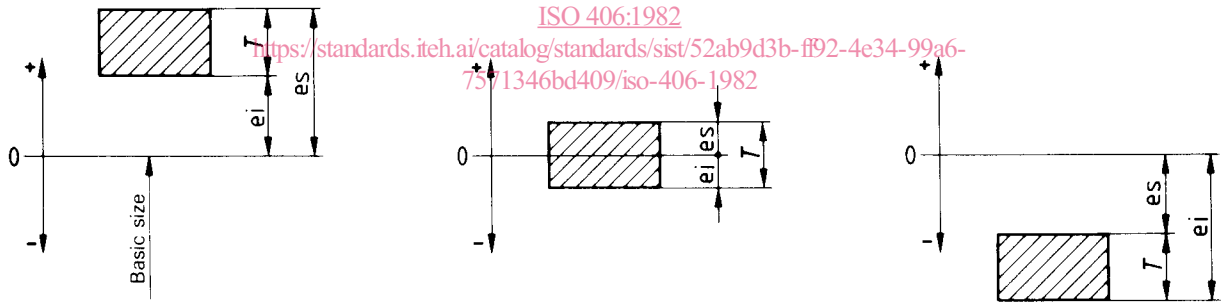
2 References

ISO 129, *Technical drawings — Dimensioning — General principles, definitions, methods of execution and special indications.*[1]

ISO 286/1, *ISO system of limits and fits — Part 1 : Bases of standard tolerances, fundamental deviations and fits.*[2]

ISO 6433, *Technical drawings — Item references.*

3 Definitions



T = **specified tolerance**

0 = **zero line**

Straight line to which the deviations are referred. The zero line is the line when the deviation is nil, and represents the basic size.

es = **upper deviation of a shaft**

Algebraical difference between the maximum limit of size and the corresponding basic size.

ei = **lower deviation of a shaft**

Algebraical difference between the minimum limit of size and the corresponding basic size.

In the figures above, the deviations are given for a shaft. For a hole, ES is used for upper deviation and EI for lower deviation.

1) At present at the stage of draft. (Revision of ISO/R 129-1959.)

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

4 Indication of the components of a linear dimension

4.1 Tolerances shown by ISO symbols

The components of the toleranced dimension shall be entered in the following order (figure 1) :

a) the basic size;

b) the tolerance symbol;[1)]

c) if it is necessary to express them, the values of the deviations, in parentheses (figure 2).

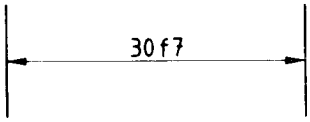


Figure 1

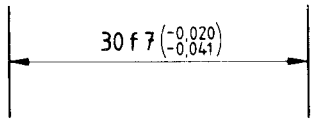


Figure 2

4.2 Tolerances shown in figures

The components of the toleranced dimension are entered in the following order (figure 3) :

a) the basic size;

b) the values of the deviations.

If one of the two deviations is nil, this should be expressed by the figure 0 (figure 4).

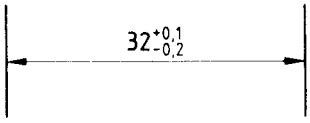


Figure 3

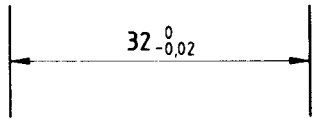


Figure 4

4.3 Symmetrically disposed tolerance

If the tolerance is disposed symmetrically to the basic size, the value of the deviations should be written once only, preceded by the sign ± (figure 5).

Figure 5

4.4 Limits of size

Limits of size may also be indicated according to figure 6.

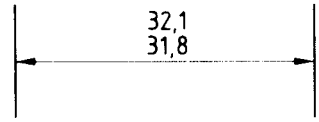


Figure 6

4.5 Limits of size in one direction

If a dimension needs to be limited in one direction only, this should be indicated by adding "min." or "max." to the dimension (figure 7).

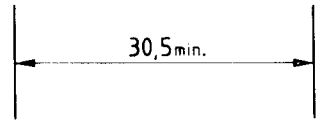


Figure 7

5 Order of indication of the deviations

The upper deviation should be written in the upper position and the lower deviation in the lower position, whether for a shaft or for a hole (figures 8 to 10).

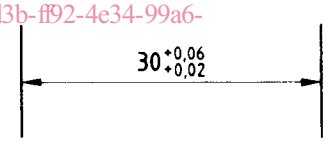


Figure 8

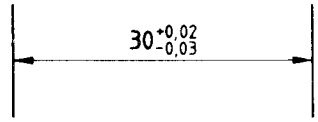


Figure 9

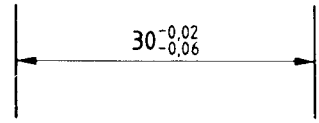


Figure 10

6 Units

6.1 Units of the deviations

The deviations should be expressed in the same unit as the basic size. If a different unit is used, this should be written after the value of the deviation; if it is the same for all the tolerances on a drawing, a general note near the drawing title block should be used.

1) See ISO 286/1.

6.2 Number of decimals

Express both deviations to the same number of decimal places (figure 2), except in the case where one of the deviations is nil (figure 4).

7 Indication of tolerances on drawings of assembled parts

7.1 Tolerances shown by ISO symbols

The tolerance symbol for the hole is placed before that of the shaft (figure 11) or above it (figure 12), the symbols being preceded by the basic size written once only.

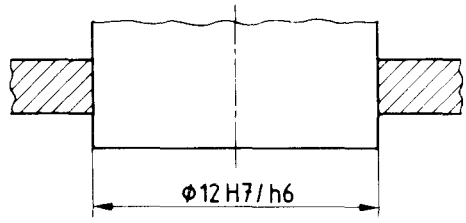


Figure 11

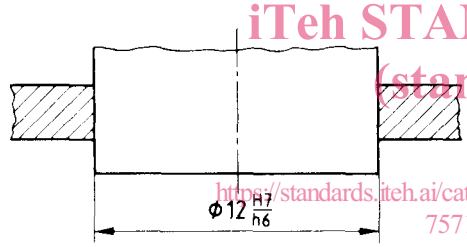


Figure 12

If it is necessary also to specify the numerical values of the deviations, they should be written in parentheses as shown in figure 13.

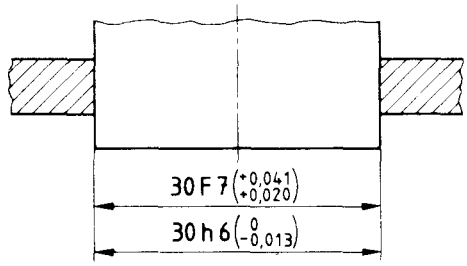


Figure 13

For the sake of simplicity, notwithstanding ISO 129, dimensioning with only one dimension line as shown in figure 14 may be used.

7.2 Tolerances shown in figures

The dimension of each of the components of the assembled parts is preceded by the name (figure 14) or item reference[1] (figure 15) of the components, the dimension for the hole being placed in both cases above that for the shaft.

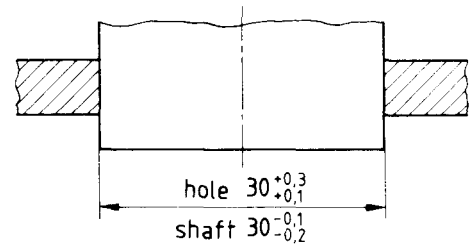


Figure 14

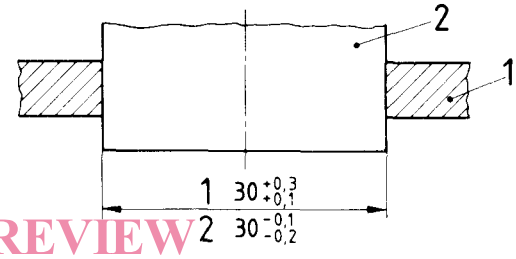


Figure 15

8 Indication of tolerances for angular dimensions

The rules given for the indication of tolerances on linear dimensions are equally applicable to angular dimensions (figures 16 to 18).

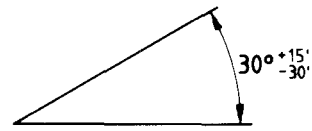


Figure 16

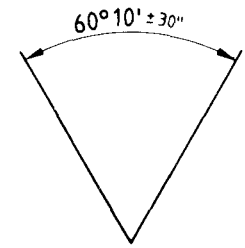


Figure 17

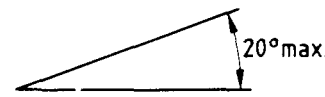


Figure 18

1) See ISO 6433.