INTERNATIONAL STANDARD

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

ISO system of limits and fits —

Part 2:
Tables of standard tolerance grades and limit deviations for holes and shafts

Système ISO de tolérances et d'ajustements —

Partie 2: Tables des degrés de tolérance normalisés et des écarts limites des alésages et des arbres

Reference number
ISO 286-2 : 1988 (E)

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.

This part of ISO 286 has been prepared by ISO/TC 3, *Limits and fits*, and, together with ISO 286-1, completes the revision of ISO/R 286, *ISO system of limits and fits*. ISO/R 286 was first published in 1962 and subsequently confirmed in November 1964; it was based on ISA Bulletin 25 first published in 1940.

The major changes incorporated in this part of ISO 286 are as follows:

a) The presentation of the information has been modified so that ISO 286 can be used directly in both the design office and the workshop. This has been achieved by separating the material dealing with the bases of the system, and the calculated values of standard tolerances and fundamental deviations, from the tables giving specific limits of the most commonly used tolerances and deviations.

b) The new symbols js and JS replace the former symbols j_s and J_S (i.e. s and S are no longer placed as subscripts) to facilitate the use of the symbols on equipment with limited character sets, e.g. computer graphics. The letters "s" and "S" stand for "symmetrical deviation".

c) Limit deviations have been included for basic sizes from 500 to 3 150 mm as standard requirements (these were previously included on an experimental basis only).

d) Limit deviations have been extended for holes H and JS, for shafts h and js, by including tolerance grades IT17 and IT18 in all basic sizes, and, for experimental purposes only, by including tolerance grades IT1 to IT5 in basic sizes over 500 mm up to 3 150 mm.

e) Limit deviations have been extended for some tolerance classes used in fine mechanisms and horology, in basic sizes up to 50 mm.

f) Inch values have been deleted.

g) The principles, terminology and symbols have been aligned with those required by contemporary technology.

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.

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0 Introduction

The need for limits and fits for machined workpieces was brought about mainly by the inherent inaccuracy of manufacturing methods, coupled with the fact that "exactness" of size was found to be unnecessary for most workpieces. In order that function could be satisfied, it was found sufficient to manufacture a given workpiece so that its size lay within two permissible limits, i.e. a tolerance, this being the variation in size acceptable in manufacture.

Similarly, where a specific fit condition is required between mating workpieces, it is necessary to ascribe an allowance, either positive or negative, to the basic size to achieve the required clearance or interference, i.e. a "deviation".

With developments in industry and international trade, it became necessary to develop formal systems of limits and fits, firstly at the industrial level, then at the national level and later at the international level.

This International Standard therefore gives the internationally accepted system of limits and fits.

A general graphical representation of the relationship between the respective tolerance classes and their deviations is given in the annex.

1 Scope

This part of ISO 286 gives values of the limit deviations for commonly used tolerance classes (zones) for holes and shafts calculated from the information given in ISO 286-1. This part of ISO 286 covers values for the upper deviations ES (for holes) and es (for shafts), and the lower deviations EI (for holes) and ei (for shafts) (see figure 1).

NOTE — In the tables of limit deviations, the values for the upper deviation ES or es are shown above the values for the lower deviation EI or ei except for tolerance class JS and js which is symmetrical about the zero line.

2 Field of application

The ISO system of limits and fits provides a system of tolerances and deviations suitable for plain workpieces.

It should be noted that the general term "hole" or "shaft" used in this International Standard can be taken as referring to the space contained by (or containing) the two parallel faces (or tangent planes) of any workpiece, such as the width of a slot or the thickness of a key (see also ISO 286-1). Similarly, the term "commonly used holes and shafts" shall be interpreted as providing a very wide choice of limit deviations suitable for a wide variety of requirements.

For further information on terminology, symbols, bases of the system, etc., see ISO 286-1.

Notes on the presentation of tables 2 to 32 are given on page 7.