

पुनर्गुट्ट 2017
Reaffirmed 2008

MASTER COPY

"पुनर्गुट्ट 2003"
"RE-AFFIRMED"

IS 2102 (Part 1) : 1993
ISO 2768-1 : 1989
(Reaffirmed 1998)

भारतीय मानक

सामान्य छूटें

भाग 1 पृथक-पृथक छूट अंकों के बिना रेखिक और कोणीय आयाम

(तीसरा पुनरीक्षण)

Indian Standard

GENERAL TOLERANCES

PART 1 TOLERANCES FOR LINEAR AND ANGULAR DIMENSIONS WITHOUT INDIVIDUAL TOLERANCE INDICATIONS

(Third Revision)

Third Reprint MARCH 2000

UDC 621.753.1 : 744.4



© BIS 1993

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

February 1993

Price Group 2



NATIONAL FOREWORD

This Indian Standard (Part 1) which is identical with ISO 2768-1 : 1989 'General tolerances — Part 1 : Tolerances for linear and angular dimensions without individual tolerance indications' was adopted by the Bureau of Indian Standards on the recommendations of the Engineering Standards Sectional Committee (LM 01) and approval of the Light Mechanical Engineering Division Council.

The standard was originally published in 1962. It was subsequently revised in 1969 and 1980.

The present revision has been made to harmonize it with ISO 2768-1 : 1989. In this revision following important changes have been made:

- a) It now covers the dimensions up to 4 000 mm.
- b) Permissible deviation for linear dimension (except for broken edges) as well as permissible deviation for broken edges for certain grades and size range have been modified.
- c) The specified value for deviation of angular dimension for coarse grade in size range 50-120 mm has been changed from 0° 25' to 0° 30'.
- d) Incorporated an annex regarding concepts behind general tolerances of linear and angular dimension.

In the adopted standard certain terminology and conventions are not identical with those used in the Indian Standard, attention is especially drawn to the following :

- a) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use point (.) as the decimal marker.
- b) Wherever the words 'International Standard' appear referring to this standard, they shall be read as 'Indian Standard'.

In the adopted standard reference appears to certain international standards for which Indian Standards also exists. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 2768-2 : 1989	IS 2102 (Part 2) : 1993 General tolerances: Part 2 Geometrical tolerances for features without individual tolerance indications dimensions	Identical
ISO 8015 : 1985	IS 12160 : 1987 Technical drawings — Fundamental tolerancing principles	Identical

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 7, BAHADUR SAHU MARG
NEW DELHI, 110002



Indian Standard

GENERAL TOLERANCES

PART 1 TOLERANCES FOR LINEAR AND ANGULAR DIMENSIONS WITHOUT INDIVIDUAL TOLERANCE INDICATIONS

(Third Revision)

1 Scope

This part of ISO 2768 is intended to simplify drawing indications and it specifies general tolerances for linear and angular dimensions without individual tolerance indications in four tolerance classes.

NOTE 1 — The concepts behind the general tolerancing of linear and angular dimensions are described in annex A.

It applies to the dimensions of parts that are produced by metal removal or parts that are formed from sheet metal.

NOTES

2 These tolerances may be suitable for use with materials other than metal.

3 Parallel International Standards exist or are planned, e.g. see ISO 8062¹⁾ for castings.

This part of ISO 2768 only applies for the following dimensions which do not have an individual tolerance indication:

- a) linear dimensions (e.g. external sizes, internal sizes, step sizes, diameters, radii, distances, external radii and chamfer heights for broken edges);
- b) angular dimensions, including angular dimensions usually not indicated, e.g. right angles (90°), unless reference to ISO 2768-2 is made, or angles of uniform polygons;
- c) linear and angular dimensions produced by machining assembled parts.

It does not apply for the following dimensions:

- a) linear and angular dimensions which are covered by reference to other standards on general tolerances;
- b) auxiliary dimensions indicated in brackets;
- c) theoretically exact dimensions indicated in rectangular frames.

2 General

When selecting the tolerance class, the respective customary workshop accuracy has to be taken into consideration. If smaller tolerances are required or larger tolerances are permissible and more economical for any individual feature, such tolerances should be indicated adjacent to the relevant nominal dimension(s).

General tolerances for linear and angular dimensions apply when drawings or associated specifications refer to this part of ISO 2768 in accordance with clauses 4 and 5. If there are general tolerances for other processes, as specified in other International Standards, reference shall be made to them on the drawings or associated specifications. For a dimension between an unfinished and a finished surface, e.g. of cast or forged parts, for which no individual tolerance is directly indicated, the larger of the two general tolerances in question applies, e.g. for castings, see ISO 8062¹⁾.

3 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 2768. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 2768 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2768-2 : 1989, *General tolerances — Part 2: Geometrical tolerances for features without individual tolerance indications.*

ISO 8015 : 1985, *Technical drawings — Fundamental tolerancing principle.*

4 General tolerances

4.1 Linear dimensions

General tolerances for linear dimensions are given in tables 1 and 2.

1) ISO 8062 : 1984, *Castings — System of dimensional tolerances.*



4.2 Angular dimensions

General tolerances specified in angular units control only the general orientation of lines or line elements of surfaces, but not their form deviations.

The general orientation of the line derived from the actual surface is the orientation of the contacting line of ideal geometrical form. The maximum distance between the contacting line and the actual line shall be the least possible value (see ISO 8015).

The permissible deviations of angular dimensions are given in table 3.

5 Indications on drawings

If general tolerances in accordance with this part of ISO 2768 shall apply, the following information shall be indicated in or near the title block:

a) "ISO 2768";

b) the tolerance class in accordance with this part of ISO 2768.

EXAMPLE

ISO 2768-m

6 Rejection

Unless otherwise stated, workpieces exceeding the general tolerance shall not lead to automatic rejection provided that the ability of the workpiece to function is not impaired (see clause A.4).

Table 1 — Permissible deviations for linear dimensions except for broken edges
(external radii and chamfer heights, see table 2)

Values in millimetres

Tolerance class		Permissible deviations for basic size range							
Designation	Description	0,5 ¹⁾ up to 3	over 3 up to 6	over 6 up to 30	over 30 up to 120	over 120 up to 400	over 400 up to 1 000	over 1 000 up to 2 000	over 2 000 up to 4 000
f	fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	—
m	medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2
c	coarse	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4
v	very coarse	—	±0,5	±1	±1,5	±2,5	±4	±6	±8

1) For nominal sizes below 0,5 mm, the deviations shall be indicated adjacent to the relevant nominal size(s).

Table 2 — Permissible deviations for broken edges (external radii and chamfer heights)

Values in millimetres

Tolerance class		Permissible deviations for basic size range		
Designation	Description	0,5 ¹⁾ up to 3	over 3 up to 6	over 6
f	fine	±0,2	±0,5	±1
m	medium			
c	coarse	±0,4	±1	±2
v	very coarse			

1) For nominal sizes below 0,5 mm, the deviations shall be indicated adjacent to the relevant nominal size(s).

Table 3 — Permissible deviations of angular dimensions

Tolerance class		Permissible deviations for ranges of lengths, in millimetres, of the shorter side of the angle concerned				
Designation	Description	up to 10	over 10 up to 50	over 50 up to 120	over 120 up to 400	over 400
f	fine	±1°	±0°30'	±0°20'	±0°10'	±0°5'
m	medium					
c	coarse	±1°30'	±1°	±0°30'	±0°15'	±0°10'
v	very coarse					

Annex A (informative)

Concepts behind general tolerancing of linear and angular dimensions

A.1 General tolerances should be indicated on the drawing by reference to this part of ISO 2768 in accordance with clause 5.

The values of general tolerances correspond to tolerance classes of customary workshop accuracy, the appropriate tolerance class being selected and indicated on the drawing according to the requirement for the components.

A.2 Above certain tolerance values, there is usually no gain in manufacturing economy by enlarging the tolerance. For example, a feature having a 35 mm diameter could be manufactured to a high level of conformance in a workshop with "customary medium accuracy". Specifying a tolerance of ± 1 mm would be of no benefit in this particular workshop, as the general tolerance values of $\pm 0,3$ mm would be quite adequate.

However, if, for functional reasons, a feature requires a smaller tolerance value than the "general tolerances", then that feature should have the smaller tolerance indicated individually adjacent to the dimension defining its size or angle. This type of tolerance falls outside the scope of general tolerances:

In cases where the function of a feature allows a tolerance equal to or larger than the general tolerance values, these should not be indicated adjacent to the dimension but should be stated on the drawing as described in clause 5. This type of tolerance allows full use of the concept of general tolerancing.

There will be "exceptions to the rule" where the function of the feature allows a larger tolerance than the general tolerances, and the larger tolerance will provide manufacturing economy. In these special cases, the larger tolerance should be indicated individually adjacent to the dimension for the particular feature, e.g. the depth of blind holes drilled at assembly.

A.3 Using general tolerances leads to the following advantages:

- drawings are easier to read and thus communication is made more effective to the user of the drawing;
- the design draughtsman saves time by avoiding detailed tolerance calculations as it is sufficient only to know that the function allows a tolerance greater than or equal to the general tolerance;

c) the drawing readily indicates which feature can be produced by normal process capability, which also assists quality engineering by reducing inspection levels;

d) those dimensions remaining, which have individually indicated tolerances, will, for the most part, be those controlling features for which the function requires relatively small tolerances and which therefore may require special effort in the production — this will be helpful for production planning and will assist quality control services in their analysis of inspection requirements;

e) purchase and sub-contract supply engineers can negotiate orders more readily since the "customary workshop accuracy" is known before the contract is placed; this also avoids arguments on delivery between the buyer and the supplier, since in this respect the drawing is complete.

These advantages are fully obtained only when there is sufficient reliability that the general tolerances will not be exceeded, i.e. when the customary workshop accuracy of the particular workshop is equal to or finer than the general tolerances indicated in the drawing.

The workshop should, therefore

- find out by measurements what its customary workshop accuracy is;
- accept only those drawings having general tolerance equal to or greater than its customary workshop accuracy;
- check by sampling that its customary workshop accuracy does not deteriorate.

Relying on undefined "good workmanship" with all its uncertainties and misunderstandings is no longer necessary with the concept of general geometrical tolerances. The general geometrical tolerances define the required accuracy of "good workmanship".

A.4 The tolerance the function allows is often greater than the general tolerance. The function of the part is, therefore, not always impaired when the general tolerance is (occasionally) exceeded at any feature of the workpiece. Exceeding the general tolerance should lead to a rejection of the workpiece only if the function is impaired.



Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc : No. LMD 01 (0126)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110 002	{ 323 76 17 323 38 41
Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Kankurgachi CALCUTTA 700 054	{ 337 84 99, 337 85 61 337 86 26, 337 91 20
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160 022	{ 60 38 43 60 20 25
Southern : C. I. T. Campus, IV Cross Road, CHENNAI 600 113	{ 235 02 16, 235 04 42 235 15 19, 235 23 15
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400 093	{ 832 92 95, 832 78 58 832 78 91, 832 78 92
Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM.	