Rough castings of light metal alloys produced by sand casting

General tolerances and machining allowances
(For replacement purposes only)

DIN 1688-1

ICS 77.150.10; 77.150.20

Supersedes
October 1980 edition.

Descriptors: General tolerances, machining allowances, castings, light metal alloys.

Gußrohteile aus Leichtmetallegierungen – Sandguß – Allgemeintoleranzen, Bearbeitungszugaben (Nicht für Neukonstruktionen)

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Dimensions in mm

1 Scope and field of application

This standard specifies general tolerances and machining allowances for rough castings of aluminium and magnesium alloys produced by sand casting, which are subject to the technical delivery conditions laid down in DIN 1725-2 and DIN 1729-2.

Users of this standard should note that it now only applies to castings used for repair and replacement purposes. New designs are covered by ISO 8062 : 1994.

Owing to the lack of empirical data, general tolerances have not been specified here for angular dimensions. If angles are to meet accuracy requirements, these shall be indicated as individual tolerances.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 1680-1	Rough castings – General tolerances and machining allowances – General
DIN 1680-2	Rough castings – System of general tolerances
DIN 1725-2	Aluminium casting alloys – Sand casting, gravity die casting, pressure die casting and investment casting
DIN 1729-2	Magnesium casting alloys – Sand casting, gravity die casting, pressure die casting
DIN 7182-1	Sizes, deviations, tolerances and fits – Basic concepts
ISO 8062 : 1994	Castings – System of dimensional tolerances and machining allowances

3 Concepts

See DIN 7182-1 and DIN 1680-1 for the terms ‘general tolerances’ and ‘tolerance grade’, and DIN 1680-1 for a definition of ‘machining allowance’.

Continued on pages 2 to 4.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

Ref. No. DIN 1688-1 : 1998-08
English price group 06 *Sales No. 0106*
11.98

4 Tolerance grades

4.1 Dimensional deviations

For rough castings of light metal alloys produced by sand casting, dimensional deviations are largely dependent on

a) the dimensional accuracy of the pattern, the care taken during moulding and casting, and the moulding and casting equipment used based on the batch size;
b) the location of the parting line (i.e. dimensions are or are not influenced by the mould; cf. DIN 1680-1);
c) the nominal sizes.

4.2 Application of tolerance grades

Limit deviations shall be specified on the basis of the tolerance grades given in tables 1 and 2. Linear dimensions and thickness shall be specified for the same grade; for exceptions see DIN 1680-1.

4.3 Nominal size ranges

The nominal size ranges shown in tables 1 and 2 for each tolerance grade have been selected on the basis of reliable measurement data.

5 Machining allowances

The machining allowance, BZ, is a function of the largest external dimension of the casting and is the same for all tolerance grades (cf. table 3); see DIN 1680-1 for exceptions.

For sizes up to 500 mm, machining allowances may be reduced to approximately half the values specified in table 3 if the pattern equipment, casting procedure and machining procedure with regard to clamping surfaces and datum surfaces have been optimized, for example, for series production, as agreed between the customer and the foundry. These reduced values are shown in table 4.

6 Designation

Where both the tolerance grade and the machining allowance have been selected on the basis of this standard, the designation of a grade GTA 16/5 tolerance (GTA 16/5) in conjunction with a machining allowance of 3,5 (BZ 3,5), for example, shall be designated as follows:

Tolerance and machining allowance DIN 1688 – GTA 16/5 – BZ 3,5

See DIN 1680-1 for other examples of designations.

Table 1: Limit deviations for linear dimensions (length, width, height, centreline distance, diameter, radius)*)

Tolerance grade	Dimensions influenced by mould	Nominal size range												Corresponds to tolerance grade... as in DIN 1680-2
		Up to 50	Over 50 up to 80	Over 80 up to 120	Over 120 up to 180	Over 180 up to 250	Over 250 up to 315	Over 315 up to 400	Over 400 up to 500	Over 500 up to 630	Over 630 up to 800	Over 800 up to 1000	Over 1000 up to 1250	
GTA 16/5	Yes	± 1	± 1,2	± 1,3	± 1,6	± 1,8	± 2	± 2,2	± 2,4	± 2,7	± 3,1	± 3,6	± 4,1	GTA 16/5
	No	± 1,3	± 1,5	± 1,8	± 2	± 2,3	± 2,6	± 2,9	± 3,2	± 3,5	± 4	± 4,5	± 5,5	GTA 16/5, plus allowance
GTA 15/5	Yes	± 0,6	± 0,75	± 0,85	± 1	± 1,2	± 1,3	± 1,4	± 1,6	± 1,7	± 2	± 2,3	± 2,6	GTA 15/5
	No	± 0,8	± 0,95	± 1,1	± 1,3	± 1,5	± 1,6	± 1,8	± 2	± 2,2	± 2,5	± 2,8	± 3,3	GTA 15/5, plus allowance

*) Irrespective of the values given in this table, the actual deviation of the linear dimensions of a casting shall in no case be greater than ± 25 % of the nominal size, rounded to one decimal place. This restriction is of particular relevance when applying the deviations in the boxes enclosed by thick lines.

Table 2: Limit deviations for thicknesses (wall, web or rib thicknesses)*)

Tolerance grade	Dimensions influenced by mould	Nominal size range		
		Up to 6	Over 6 up to 10	Over 10
GTA 16/5	Yes	± 1,2	± 1,6	± 2
	No	± 1,5	± 2,3	± 3
GTA 15/5	Yes	± 0,6	± 1,2	± 1,8
	No	± 0,8	± 1,5	± 2,2

*) Irrespective of the values given in this table, the actual deviation of the linear dimensions of a casting shall in no case be greater than ± 25 % of the nominal size, rounded to one decimal place. This restriction is of particular relevance when applying the deviations in the boxes enclosed by thick lines.

The limit deviations specified in table 2 have not been derived from a specific tolerance series.

Table 3: Machining allowances, BZ

Nominal size range (based on the largest overall dimension of casting)	Up to 30	Over 30 up to 50	Over 50 up to 120	Over 120 up to 180	Over 180 up to 250	Over 250 up to 350	Over 350 up to 500	Over 500 up to 1000	Over 1000 up to 2500	Over 2500 up to 4000
Machining allowance, BZ	2	2	2,5	3,5	3,5	4	4	6	8	10

Table 4: Reduced machining allowances, BZ (see clause 5)

Nominal size range (based on the largest overall dimension of casting)	Up to 30	Over 30 up to 50	Over 50 up to 120	Over 120 up to 180	Over 180 up to 250	Over 250 up to 350	Over 350 up to 500
Machining allowance, BZ	1	1	1,5	2	2	2	2

7 Indicating general tolerances on existing drawings

If an existing drawing does NOT refer to the tolerance groups specified in the 1958 edition of this standard (which is no longer valid), then the tolerance grades given in tables 1 and 2 do not apply. It is recommended that a grade suitable for the casting in question be indicated on such drawings.

If an existing drawing DOES refer to the previously valid tolerance groups, it is recommended that these be converted to the tolerance grades specified in tables 1 and 2 of the present standard. If this is not possible, the permissible limit deviations are to be taken from tables 5 and 6 below.

Tables 5 and 6 do NOT apply to new drawings.

Table 5: Limit deviations for linear dimensions on existing drawings

Tolerance group	Nominal size range										
	Up to 50	Over 50 up to 80	Over 80 up to 120	Over 120 up to 180	Over 180 up to 250	Over 250 up to 315	Over 315 up to 400	Over 400 up to 500	Over 500 up to 630	Over 630 up to 800	Over 800 up to 1000
A 1	+ 1 – 0,8	+ 1,2 – 0,9	+ 1,4 – 1,1	+ 1,6 – 1,3	+ 1,8 – 1,5	+ 2,1 – 1,6	+ 2,3 – 1,8	+ 2,5 – 2	+ 2,7 – 2,2	+ 3 – 2,4	+ 3,3 – 2,6
A 2	+ 1,6 – 1,2	+ 1,9 – 1,5	+ 2,2 – 1,7	+ 2,5 – 2	+ 2,9 – 2,3	+ 3,2 – 2,6	+ 3,6 – 2,9	+ 4 – 3,2	+ 4,3 – 3,4	+ 4,7 – 3,7	+ 5,2 – 4,2
B 1	+ 0,8 – 0,6	+ 0,9 – 0,7	+ 1,1 – 0,9	+ 1,3 – 1	+ 1,5 – 1,2	+ 1,6 – 1,3	+ 1,8 – 1,4	+ 2 – 1,6	+ 2,2 – 1,7	+ 2,4 – 1,9	+ 2,6 – 2,1
B 2	+ 1 – 0,8	+ 1,2 – 0,9	+ 1,4 – 1,1	+ 1,6 – 1,3	+ 1,9 – 1,5	+ 2,1 – 1,6	+ 2,3 – 1,8	+ 2,5 – 2	+ 2,7 – 2,2	+ 3 – 2,4	+ 3,3 – 2,6
C 1	+ 0,5 – 0,4	+ 0,6 – 0,5	+ 0,7 – 0,6	+ 0,8 – 0,6	+ 0,9 – 0,7	+ 1 – 0,8	+ 1,2 – 0,9	+ 1,3 – 1	+ 1,4 – 1,1	+ 1,5 – 1,2	+ 1,7 – 1,3
C 2	+ 0,8 – 0,6	+ 0,9 – 0,7	+ 1,1 – 0,9	+ 1,3 – 1	+ 1,5 – 1,2	+ 1,6 – 1,3	+ 1,8 – 1,4	+ 2 – 1,6	+ 2,2 – 1,7	+ 2,4 – 1,9	+ 2,6 – 2,1

Table 6: Limit deviations for thicknesses on existing drawings

Tolerance group	Nominal size range		
	Up to 6	Over 6 up to 10	Over 10 up to 18
A 1	± 1,2	± 1,6	± 2
A 2	± 1,6	± 2,3	± 3
B 1	± 0,6	± 1,2	± 1,8
B 2	± 0,8	± 1,5	± 2,2
C 1	± 0,4	± 0,6	± 0,8
C 2	± 0,6	± 0,8	± 1

8 Indicating machining allowances on existing drawings

The machining allowances specified in this standard only apply to drawings on which general tolerances in accordance with clause 4 and tables 1 and 2 of this standard are indicated.

Previous editions

DIN 1688-1: 1958-04, 1974-08, 1980-10.

Amendments

As compared with the October 1980 edition, the standard now applies only to castings used for replacement purposes.

Other relevant standard

DIN 1690-1 Technical delivery conditions for castings of metallic materials – General