

Light metal alloy raw castings
Gravity die castings
General tolerances, machining allowances

DIN
1688
Part 3

Gußrohnteile aus Leichtmetalllegierungen; Kokillenguß; Allgemeintoleranzen, Bearbeitungszugaben

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 Field of application

This standard specifies general tolerances for light metal alloy raw castings produced by the gravity die casting process, for which the technical delivery conditions are set out in such standards as DIN 1725 Part 2 and DIN 1729 Part 2. It also specifies machining allowances for aluminium alloy and magnesium alloy raw castings with surfaces which are to be machined.

Owing to the unavailability of empirical data, no general tolerances have been specified for angular dimensions. If angles are to meet specific accuracy requirements, then these shall be indicated accordingly as individual tolerances.

2 Standards to be observed

- DIN 1680 Part 1 Raw castings; general tolerances and machining allowances
- DIN 1680 Part 2 Raw castings; system of general tolerances
- DIN 1690 General technical delivery conditions for metal castings

3 Concepts

The concepts "general tolerances" and "accuracy grade", as defined in DIN 7182 Part 1, have been applied in DIN 1680 Part 1 to raw castings.

The concept "machining allowance" is defined in DIN 1680 Part 1.

4 Accuracy grades

4.1 Dimensional deviations

The main factors influencing the dimensional deviations of light metal alloy castings produced by the gravity die casting process are essentially:

- a) the dimensional accuracy of the gravity die;
- b) the location of the cores, core slides and the die parting line, by which the dimensions are subdivided into dimensions intrinsic to the die halves and composite dimensions made up by two or more die members (see DIN 1680 Part 1);
- c) the magnitude of the basic sizes.

4.2 Application of accuracy grades

The specification of permissible deviations shall be based on the accuracy grades given in tables 1 and 2. The same accuracy grade shall apply for linear dimensions and thicknesses alike, except for the cases given in DIN 1680 Part 1.

4.3 Limits of basic size range

The correlation between the permissible deviations and the basic sizes ranges specified for each accuracy grade has been established on the basis of reliable measurement data.

5 Machining allowances

The machining allowance, *BZ*, is a function of the greatest external dimension of the raw casting. It is the same for all accuracy grades, except for the cases given in DIN 1680 Part 1; see table 3.

If, in the series production of raw castings for example, manufacturer and customer have optimized the pattern equipment, casting process, and machining operations (as regards the chucking and working faces), then the machining allowances for raw castings with external dimensions up to a maximum of 350 mm may be reduced to approximately half the values specified in table 3 (see table 4).

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6 Designation

Where the general tolerance is to be indicated as accuracy grade GTA 14/5 in conjunction with machining allowance BZ 1,5 (i.e. where both accuracy grade and machining allowance have been selected on the basis of the present standard), then the designation shall be:

Tolerance and machining allowance DIN 1688 – GTA 14/5 – BZ 1,5

See DIN 1680 Part 1 for further examples of designation.

Table 1. Permissible deviations for linear dimensions (length, width, height, centre line distance, diameter, radii)

Accuracy grade	Relation to die	Basic size range *)														Corresponds to general tolerance series as in DIN 1680 Part 2
		Up to 18	Over 18 up to 30	Over 30 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 15/5	Intrinsic	± 0,45	± 0,5	± 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
	Not intrinsic	± 0,55	± 0,65	± 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
GTA 15	Intrinsic	± 0,35	± 0,4	± 0,5	± 0,6	± 0,7	± 0,8	± 0,95	± 1,1	± 1,2	± 1,3	± 1,4	± 1,6	± 1,8	± 2,1	GTA 15
	Not intrinsic	± 0,45	± 0,5	± 0,6	± 0,75	± 0,85	± 1	± 1,2	± 1,3	± 1,4	± 1,6	± 1,7	± 2	± 2,3	± 2,6	GTA 15 plus allowance
GTA 14/5	Intrinsic	± 0,25	± 0,35	± 0,4	± 0,45	± 0,55	± 0,65	± 0,75	± 0,8	± 0,85	± 0,95	± 1,1	± 1,2	± 1,4	± 1,6	GTA 14/5
	Not intrinsic	± 0,35	± 0,4	± 0,5	± 0,6	± 0,7	± 0,8	± 0,95	± 1,1	± 1,2	± 1,3	± 1,4	± 1,6	± 1,8	± 2,1	GTA 14/5 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 basic size concerned, rounded to one decimal place. This restriction shall be taken into account when applying the deviations in the boxes enclosed by thick lines in the above table.

Table 2. Permissible deviations for thicknesses (wall, web, and rib thicknesses)

Accuracy grade	Relation to die	Basic size range *)		
		Up to 6	Over 6 up to 10	Over 10 up to 18
GTA 15/5	Intrinsic	± 0,6	± 1,2	± 1,8
	Not intrinsic	± 0,8	± 1,5	± 2,2
GTA 15	Intrinsic	± 0,4	± 0,6	± 0,8
	Not intrinsic	± 0,6	± 0,8	± 1
GTA 14/5	Intrinsic	± 0,3	± 0,4	± 0,5
	Not intrinsic	± 0,5	± 0,6	± 0,7

*) 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 basic size concerned, rounded to one decimal place. This restriction shall be taken into account when applying the deviations in the boxes enclosed by thick lines in the above table.

The permissible 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 greatest external dimension of the 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 1250
Machining allowance, BZ	1	1,5	1,5	2	2,5	2,5	3	4	4

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

Nominal size range based on the greatest external dimension of the casting	Up to 30	Over	Over	Over	Over	Over
		30 up to 50	50 up to 120	120 up to 180	180 up to 250	250 up to 350
Machining allowance, <i>BZ</i>	0,5	0,8	0,8	1	1,5	1,5

7 Indication of general tolerances on existing drawings

If no reference is made on existing drawings to tolerance groups previously specified in draft Standard DIN 1688 Part 1, April 1958 edition, withdrawn in 1969, then the accuracy grades given in tables 1 and 2 shall not apply. It is recommended that an appropriate accuracy grade for the casting concerned be indicated on such drawings.

If a reference is made on existing drawings to the tolerance groups referred to above, then it is recommended that these be converted to the accuracy grades specified in tables 1 and 2. Where this is impossible, the permissible deviations specified in tables 5 and 6 shall be used.

The tolerance groups specified in tables 5 and 6 are, however, not to be used on new drawings. It is intended that these tolerance groups be deleted when the present standard is next revised.

Table 5. **Permissible deviations for linear dimensions (length, width, height, centre line distance, diameter, radii) on existing drawings**

Tolerance group	Basic 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. **Permissible deviations for thicknesses (wall, web, and rib thicknesses) on existing drawings**

Tolerance group	Basic 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 Indication of machining allowances on existing drawings

The machining allowances specified in this standard shall only be used for drawings on which general tolerances are indicated that are in accordance with clause 4, or tables 1 and 2.

Explanatory notes

When the introduction of standardized machining allowances for raw castings was discussed, it was deemed expedient to combine the general tolerances and machining allowances for castings made of a specific material in the same standard.

All relevant explanatory information will be found in DIN 1680 Part 1, which should always be consulted when using the present standard.