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Geometriska produktspecifikationer (GPS) – Dimensionstoleranser och geometriska toleranser för formstycken – Del 3: Generella toleranser och bearbetningstillägg för gjutgods (ISO 8062-3:2007)

Geometrical Product Specifications (GPS) – Dimensional and geometrical tolerances for moulded parts – Part 3: General dimensional and geometrical tolerances and machining allowances for castings (ISO 8062-3:2007)

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Geometrical Product Specifications (GPS) - Dimensional and geometrical tolerances for moulded parts - Part 3: General dimensional and geometrical tolerances and machining allowances for castings (ISO 8062-3:2007)

Spécification géométrique des produits (GPS) - Tolérances dimensionnelles et géométriques des pièces moulées - Partie 3: Tolérances dimensionnelles et géométriques générales et surépaisseurs d'usinage pour les pièces moulées (ISO 8062-3:2007)

Geometrische Produktspezifikation (GPS) - Maß-, Form- und Lagetoleranzen für Formteile - Teil 3: Allgemeine Maß-, Form- und Lagetoleranzen und Bearbeitungszugaben für Gussstücke (ISO 8062-3:2007)

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Foreword

This document (EN ISO 8062-3:2007) has been prepared by Technical Committee ISO/TC 213 "Dimensional and geometrical product specifications and verification" in collaboration with Technical Committee CEN/TC 190 "Foundry technology", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2007, and conflicting national standards shall be withdrawn at the latest by December 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 8062-3:2007 has been approved by CEN as EN ISO 8062-3:2007 without any modifications.

Introduction

This part of ISO 8062 is a geometrical product specification (GPS) standard and is to be regarded as a complementary process-specific tolerance standard (see ISO/TR 14638). It influences chain link 2 of the chain of standards on mouldings.

For more detailed information about the relation of this part of ISO 8062 to other standards and the GPS matrix model, see Annex F.

This part of ISO 8062 defines a system of tolerance grades and machining allowance grades for cast metals and their alloys.

The specified system applies if the manufacturer provides a pattern or die equipment, or accepts responsibility for proving it.

The tolerances specified for a casting may determine the casting method. It is therefore recommended, before the design or the order is finalized, that the customer liaise with the foundry to discuss:

- a) the proposed casting design and accuracy required;
- b) machining requirements;
- c) the method of casting;
- d) the location of the parting surfaces and the necessary draft angles;
- e) the number of castings to be manufactured;
- f) the casting equipment involved;
- g) the consequences of the wear-out of the equipment during its life cycle;
- h) the datum system in accordance with ISO 5459;
- i) the casting alloy;
- j) any special requirements, e.g. individual dimensional and geometrical tolerances, fillet radii, tolerances and individual machining allowances;

NOTE Because the dimensional and geometrical accuracy of a casting is related to production factors, tolerance grades which can be achieved for various methods and metals are described in Annex A.

- k) dimensional tolerances for long series and mass production, where development, adjustment and maintenance of casting equipment make it possible to achieve close tolerances;
- l) dimensional tolerances for short series and single production;
- m) geometrical tolerances.

Information on typical required machining allowance grades is given in Annex B.

Geometrical product specifications (GPS) — Dimensional and geometrical tolerances for moulded parts —

Part 3: General dimensional and geometrical tolerances and machining allowances for castings

1 Scope

This part of ISO 8062 specifies general dimensional and geometrical tolerances, as well as machining allowance grades, for castings as delivered to the purchaser in accordance with ISO 8062-2. It is applicable for the tolerancing of dimensions and geometry, and required machining allowance of castings in all cast metals and their alloys produced by various casting manufacturing processes.

This part of ISO 8062 applies to both general dimensional and general geometrical tolerances (referred to in or near the title block of the drawing), unless otherwise specified, and where specifically referred to on the drawing by one of the references in Clause 9.

The dimensional tolerances covered by this part of ISO 8062 are tolerances for linear dimensions.

The geometrical tolerances covered by this part of ISO 8062 are:

- tolerances for straightness,
- flatness,
- roundness,
- parallelism,
- perpendicularity,
- symmetry, and
- coaxiality.

This part of ISO 8062 can be used for the selection of tolerance values for individual indications.

NOTE This part of ISO 8062 does not apply to 3D CAD models used without indicated dimensions.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 286-1:1988, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits*

ISO 1101:2004, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

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ISO 1302:2002, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 5459:—¹⁾, *Geometrical product specifications (GPS) — Geometrical tolerancing — Datums and datum-systems*

ISO 8062-1:2007, *Geometrical product specifications (GPS) — Dimensional and geometrical tolerances for moulded parts — Part 1: Vocabulary*

ISO/TS 8062-2:—²⁾, *Geometrical product specifications (GPS) — Dimensional and geometrical tolerances for moulded parts — Part 2: Rules*

ISO 10135:—³⁾, *Geometrical product specifications (GPS) — Drawing indications for moulded parts in technical product documentation (TPD)*

ISO 10579:1993, *Technical drawings — Dimensioning and tolerancing — Non-rigid parts*

ISO 14405:—⁴⁾, *Geometrical product specifications (GPS) — Dimensional tolerancing — Linear sizes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8062-1, ISO 1101 and ISO 5459 apply.

4 Abbreviated terms

Abbreviated terms are given in Table 1.

Table 1 — Abbreviated terms

Abbreviated term	Interpretation	Reference
DCT	Dimensional casting tolerance	5.2
DCTG	Dimensional casting tolerance grade	5.2
GCT	Geometrical casting tolerance	5.3
GCTG	Geometrical casting tolerance grade	5.3
RMA	Required machining allowance	Clause 8
RMAG	Required machining allowance grade	Clause 8
TP	Taper +	ISO 10135
TM	Taper -	ISO 10135
SMI	Surface mismatch	ISO 10135

1) To be published. Revision of ISO 5459:1981.
 2) To be published. Revision of ISO 8062:1994.
 3) To be published. Revision of ISO 10135:1994.
 4) To be published.

5 Tolerance grades

5.1 General

Individual dimensional and geometrical tolerances shall be indicated in accordance with the relevant GPS standards on dimensional and geometrical tolerancing.

If using general tolerances, the necessity of smaller tolerances (for functional reasons) or of larger tolerances (for economical reasons) needs to be ascertained (see Annex C). In both cases, individual tolerances shall be indicated.

For drawings where the tolerances in accordance with this part of ISO 8062 only apply under specified, restricted conditions, ISO 10579 shall be referred to on the drawing.

5.2 Dimensional casting tolerance grades (DCTG)

Sixteen linear dimensional casting tolerance grades are defined and designated as DCTG 1 to DCTG 16 (see Table 2).

NOTE 1 For wall thicknesses, see Clause 7.

Table 2 — Linear dimensional casting tolerances (DCT)

Dimensions in millimetres

Nominal dimensions related to the moulded part		Linear dimensional tolerance for dimensional casting tolerance grade (DCTG) ^a															
		DCTG 1	DCTG 2	DCTG 3	DCTG 4	DCTG 5	DCTG 6	DCTG 7	DCTG 8	DCTG 9	DCTG 10	DCTG 11	DCTG 12	DCTG 13	DCTG 14	DCTG 15	DCTG 16 ^b
—	≤ 10	0,09	0,13	0,18	0,26	0,36	0,52	0,74	1	1,5	2	2,8	4,2	—	—	—	—
> 10	≤ 16	0,1	0,14	0,2	0,28	0,38	0,54	0,78	1,1	1,6	2,2	3	4,4	—	—	—	—
> 16	≤ 25	0,11	0,15	0,22	0,3	0,42	0,58	0,82	1,2	1,7	2,4	3,2	4,6	6	8	10	12
> 25	≤ 40	0,12	0,17	0,24	0,32	0,46	0,64	0,9	1,3	1,8	2,6	3,6	5	7	9	11	14
> 40	≤ 63	0,13	0,18	0,26	0,36	0,5	0,7	1	1,4	2	2,8	4	5,6	8	10	12	16
> 63	≤ 100	0,14	0,2	0,28	0,4	0,56	0,78	1,1	1,6	2,2	3,2	4,4	6	9	11	14	18
> 100	≤ 160	0,15	0,22	0,3	0,44	0,62	0,88	1,2	1,8	2,5	3,6	5	7	10	12	16	20
> 160	≤ 250	—	0,24	0,34	0,5	0,7	1	1,4	2	2,8	4	5,6	8	11	14	18	22
> 250	≤ 400	—	—	0,4	0,56	0,78	1,1	1,6	2,2	3,2	4,4	6,2	9	12	16	20	25
> 400	≤ 630	—	—	—	0,64	0,9	1,2	1,8	2,6	3,6	5	7	10	14	18	22	28
> 630	≤ 1 000	—	—	—	—	1	1,4	2	2,8	4	6	8	11	16	20	25	32
> 1 000	≤ 1 600	—	—	—	—	—	1,6	2,2	3,2	4,6	7	9	13	18	23	29	37
> 1 600	≤ 2 500	—	—	—	—	—	—	2,6	3,8	5,4	8	10	15	21	26	33	42
> 2 500	≤ 4 000	—	—	—	—	—	—	—	4,4	6,2	9	12	17	24	30	38	49
> 4 000	≤ 6 300	—	—	—	—	—	—	—	—	7	10	14	20	28	35	44	56
> 6 300	≤ 10 000	—	—	—	—	—	—	—	—	—	11	16	23	32	40	50	64

^a For wall thicknesses in grades DCTG 1 to DCTG 15, one grade coarser applies (see Clause 7).

^b Grade DCTG 16 exists only for wall thicknesses of castings generally specified to DCTG 15.

NOTE 2 Annex A gives recommendations for the application of the above tolerance grades.

As the default conditions for the dimensions, the casting tolerance shall be symmetrically disposed with respect to the nominal dimension, i.e. with one half on the positive side and one half on the negative side.

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If agreed between manufacturer and purchaser for specific reasons, the casting tolerance may be asymmetric. In such cases, the casting tolerance shall be stated individually, in accordance with ISO 286-1 and ISO 14405, following the nominal dimensions of the final moulded part.

NOTE 3 In pressure die casting, an asymmetric tolerance disposition is often applied because of special technical reasons.

5.3 Geometrical casting tolerance grades (GCTG)

5.3.1 General

Seven geometrical casting tolerance grades (GCTG) are defined and designated as GCTG 2 to GCTG 8 (see Tables 3 to 6).

NOTE 1 GCT values are not given for grade GCTG 1. This grade is reserved for finer values which could be required in the future.

NOTE 2 See Annex E for application of general geometrical tolerances for castings.

General tolerances on form (straightness, flatness, roundness) and on orientation (angularity, parallelism, perpendicularity) do not apply to features with draft. These features need individual indicated tolerances, according to the function and to the manufacturer’s advice.

Other geometrical tolerances than those given in Tables 3 to 6 (e.g. angularity, profile, position, common zone flatness) shall be indicated individually.

It is therefore recommended to acquire from the manufacturer the information about the design of the mould regarding the location of the parting surfaces and the amount of draft applied to the features, in order to complete the drawing (see Introduction).

5.3.2 Nominal dimensions

The nominal dimension to be used in Tables 3 to 6 shall be the longest nominal dimension of the moulded part of the considered feature, disregarding the nominal dimension of fillets and chamfers that are not individually indicated.

5.3.3 Datums

5.3.3.1 Datums for general orientation tolerances

For general orientation tolerances in accordance with ISO 8062-3, a datum system shall be specified on the drawing and identified by the indication “ISO 8062-3 DS” in or near the title block of the drawing, as shown in Figure 1.

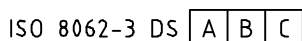


Figure 1 — Drawing indication for the datum system for general orientation tolerances in accordance with ISO 8062-3

NOTE This datum system does not apply to general geometrical tolerances on coaxiality and symmetry (see 5.3.3.2 and 5.3.3.3).

5.3.3.2 Datums for general coaxiality tolerances

For datums of general coaxiality tolerances, the following conditions apply.

- If one cylindrical feature (internal or external) extends over the whole length of all other cylindrical coaxial features, the axis of this feature applies as the (single) datum (see Figure D.1).
- Otherwise, a common datum applies, composed of the axes of the two most separated features on the drawing centre line considered (see Figure D.2). If more than one possibility exist (e.g. internal or external features), the feature with the largest diameter applies (see Figure D.3).

The general tolerances for coaxiality also apply to the datum features themselves, if a common datum applies.

5.3.3.3 Datums for general symmetry tolerances

For datums of general symmetry tolerances, the following conditions apply.

- If one feature of size (internal or external), composed of two parallel opposite planes, extends over the whole length of all other co-symmetrical features, the median plane of this feature applies as the (single) datum (see Figure D.4).
- Otherwise, a common datum applies, composed of the median planes and/or median lines of the two most separated feature on the drawing centre line (plane) considered (see Figure D.5). If more than one possibility exist, the feature(s) with the largest size(s) apply (see Figure D.6). One of the two datum features may be cylindrical (see Figure D.7).

The general tolerances for symmetry also apply to the datum features themselves, if a common datum applies.

Table 3 — Casting tolerances for straightness

Dimensions in millimetres

Nominal dimension related to the moulded part		Straightness tolerance for geometrical casting tolerance grade (GCTG)						
		GCTG 2	GCTG 3	GCTG 4	GCTG 5	GCTG 6	GCTG 7	GCTG 8
—	≤ 10	0,08	0,12	0,18	0,27	0,4	0,6	0,9
> 10	≤ 30	0,12	0,18	0,27	0,4	0,6	0,9	1,4
> 30	≤ 100	0,18	0,27	0,4	0,6	0,9	1,4	2
> 100	≤ 300	0,27	0,4	0,6	0,9	1,4	2	3
> 300	≤ 1 000	0,4	0,6	0,9	1,4	2	3	4,5
> 1 000	≤ 3 000	—	—	—	3	4	6	9
> 3 000	≤ 6 000	—	—	—	6	8	12	18
> 6 000	≤ 10 000	—	—	—	12	16	24	36