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

**Part 4:  
General tolerances for castings using  
profile tolerancing in a general  
datum system**

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*Spécification géométrique des produits (GPS) — Tolérances  
dimensionnelles et géométriques pour les pièces moulées —*

*Partie 4: Tolérances générales pour les pièces moulées par  
tolérancement de profil dans un système général de références  
spécifiées*



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# Contents

	Page
Foreword.....	iv
Introduction.....	v
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>1</b>
<b>4 Symbols.....</b>	<b>3</b>
<b>5 Rules.....</b>	<b>4</b>
5.1 Rule A: Application of general tolerances for castings.....	4
5.2 Rule B: General surface profile tolerances.....	4
5.3 Rule C: General datum system.....	4
5.4 Rule D: Tolerances overruling the general surface profile tolerances.....	4
5.5 Rule E: Additional tolerances.....	5
5.6 Rule F: Machined condition [application case A c)].....	5
5.7 Rule G: Required machining allowances (RMAs).....	5
5.8 Rule H: Draft angle (taper).....	6
<b>6 General tolerances.....</b>	<b>7</b>
<b>7 Required machining allowances.....</b>	<b>9</b>
<b>8 Draft angles (tapers).....</b>	<b>10</b>
<b>9 General drawing indication.....</b>	<b>12</b>
<b>Annex A (informative) Concept of general tolerancing.....</b>	<b>14</b>
<b>Annex B (informative) Selection of general tolerances.....</b>	<b>16</b>
<b>Annex C (informative) Selection of required machining allowances (RMAs).....</b>	<b>17</b>
<b>Annex D (informative) Example of using general tolerances.....</b>	<b>18</b>
<b>Annex E (informative) Calculation of the nominal dimension of the moulded condition.....</b>	<b>21</b>
<b>Annex F (informative) Relation to the GPS matrix model.....</b>	<b>24</b>
<b>Bibliography.....</b>	<b>25</b>

## 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

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A list of all parts in the ISO 8062 series can be found on the ISO website.

## Introduction

This document is a geometrical product specification (GPS) standard and is regarded as a complementary process-specific tolerance standard (see ISO 14638). It influences chain link B of the chain of standards on mouldings.

The ISO GPS matrix model given in ISO 14638 gives an overview of the ISO GPS system, of which this document is a part. The fundamental rules of ISO/GPS given in ISO 8015 apply to this document and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this document, unless otherwise indicated.

For more detailed information about the relation of this document to other standards and the GPS matrix model; see [Annex F](#).

This document defines a system of tolerance grades, draft angle (taper) grades and machining allowance grades for cast metals and their alloys.

ISO/TS 8062-2 states, in relation to the accumulation method where general dimensional tolerances according to ISO 8062-3 are used, that there is not yet a clearly defined way in the context of the future system of GPS standards to apply the rules for calculating of the final moulded part nominal dimensions from the final machined moulded part nominal dimensions, taking into account the miscellaneous influences.

One of the reasons for this problem is the lack of a proper workpiece datum system.

The general dimensional tolerances apply independently from each other (without a datum system). It is difficult or even impossible to assess what the overall shape of the workpiece can become.

The general dimensional tolerances ( $\pm$  tolerances) of ISO 8062-3 apply not only to sizes but also to centre distances and dimensions defining profile contours. This is in contradiction to the GPS rules (e.g. ISO 14405-2). <https://standards.iteh.ai/catalog/standards/sist/855db0ce-e0df-428a-abf1-5b4183252d62/iso-8062-4-2017>

Furthermore, with 3D CAD, the nominal dimensions are not always visible in the model. As the general dimensional tolerances depend on the nominal dimensions, they cannot be used any more when only the CAD model is available.

For these reasons, the use of ISO 8062-3 from a GPS-point of view cannot be recommended. This document avoids the insufficiencies of ISO 8062-3 described above and is in full compliance with the GPS rules. The general tolerances according to ISO 8062-3 are not comparable with the general tolerances according to this document.

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

## Part 4: General tolerances for castings using profile tolerancing in a general datum system

### 1 Scope

This document specifies general geometrical tolerances using surface profile tolerances related to a general datum system that remains on the final part. It also specifies machining allowances and draft angles (tapers) for castings in all cast metals and their alloys produced by various casting manufacturing processes.

NOTE When there is no datum system (target or integral) on surfaces remaining in the final condition, this document cannot be applied.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 1660, *Geometrical product specifications (GPS) — Geometrical tolerancing — Profile tolerancing*

ISO 2692, *Geometrical product specifications (GPS) — Geometrical tolerancing — Maximum material requirement (MMR), least material requirement (LMR) and reciprocity requirement (RPR)*

ISO 5458, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Positional tolerancing*

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

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

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

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

ISO 10579, *Geometrical product specifications (GPS) — Dimensioning and tolerancing — Non-rigid parts*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1101, ISO 1660, ISO 2692, ISO 5458, ISO 5459, ISO 8062-1, ISO/TS 8062-2, ISO 10135, ISO 10579 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

**3.1**  
**draft angle**  
**taper**

value of inclination (angle) that is added to a geometrical feature of a pattern or mould to ensure the removal of the pattern or moulded part from the mould

[SOURCE: ISO 8062-1:2007, 2.15, modified]

**3.1.1**  
**external draft angle**

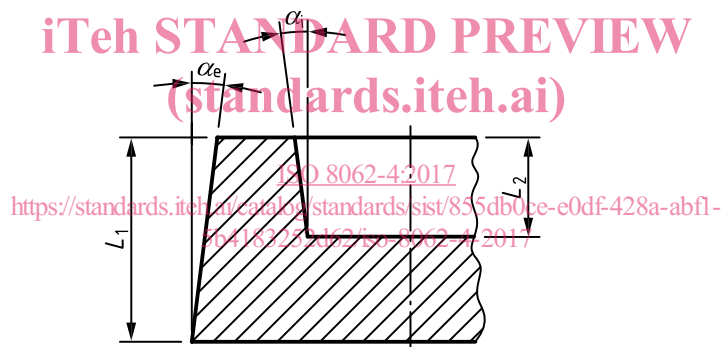
*draft angle* (3.1) on a surface that has no opposite surface in the direction outward of the part

Note 1 to entry: See [Figure 1](#).

**3.1.2**  
**internal draft angle**

*draft angle* (3.1) on a surface that has an opposite surface in the direction outward of the part

Note 1 to entry: See [Figure 1](#).



**Key**  
 $\alpha_e$  external draft angle  
 $\alpha_i$  internal draft angle

**Figure 1 — External and internal draft angles**

**3.1.3**  
**draft angle increasing the ideal model feature(s)**  
*draft angle* (3.1) which is part of the ideal model

Note 1 to entry: See [Figure 3 a](#)).

**3.1.4**  
**draft angle increasing the tolerance of feature(s)**  
*draft angle* (3.1) which is added to the ideal model and included in the tolerance zone

Note 1 to entry: See [Figure 3 b](#)).



3.2

**general datum system RST**

datum system according to ISO 5459, using the datum letters R, S, T, locking all degrees of freedom and used for the general tolerance

Note 1 to entry: See [Figure D.2](#).

Note 2 to entry: It is recommended to use a datum target system RST; see [Figure D.1](#).

Note 3 to entry: The datum letters R, S, T, are reserved for the general datum system; see Rule C.

**4 Symbols**

Symbol	Description	Source
	moulded surface	ISO 1302
	machined surface	
	moulded or machined surface	
	surface profile tolerance	ISO 1101
	positional tolerance	
	theoretically exact dimension	
	datum of datum target	ISO 5459
	datum target, fixed, moveable	
	general tolerance	<a href="#">5.2</a> , <a href="#">5.3</a>
	parting surface	ISO 10135
	parting surface	
		moveable
		fixed
	draft angle increasing the ideal model feature(s)	ISO 10135
	draft angle increasing the tolerance of feature(s)	<a href="#">5.8</a>
	moulded condition	ISO/TS 8062-2
	intermediate (pre)machined	
	final machined	
	provided by supplier	

## 5 Rules

### 5.1 Rule A: Application of general tolerances for castings

The general tolerances for castings according to this document may be used on drawings showing:

- a) the moulded condition only (see [Figure D.2](#));
- b) the premachined condition and referring to the general tolerances for castings for the features remaining as moulded;
- c) the final machined condition and referring to the general tolerances for the moulded condition (before machining).

Prerequisite is a general datum system RST on surfaces remaining as moulded; see Rule C.

### 5.2 Rule B: General surface profile tolerances

The general tolerances according to this document are any surface profile tolerances related to a general datum system RST according to ISO 5459; see Rule C. The general tolerance is to be indicated in or near the drawing title block.

The general surface profile tolerance applies to all surfaces with the exception of Rule D.

### 5.3 Rule C: General datum system

A general datum system RST shall be indicated in the drawing.

When a general datum system RST is used, established by datum targets (preferred method), the general profile tolerances according to [Table 1](#) apply also to the datum features, if not otherwise indicated.

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When an integral general datum system RST is used, established by integral features, the general profile tolerances according to [Table 1](#) do not apply to the datum features. In such cases, the datum features shall be tolerated separately by:

- an unrelated profile (form) tolerance for the primary datum;
- a profile tolerance related to the primary datum for the secondary datum;
- a profile tolerance related to the primary and to the secondary datum for the tertiary datum.


NOTE When there is no datum system (target or integral) on surfaces remaining in the final condition, this document cannot be applied.

### 5.4 Rule D: Tolerances overruling the general surface profile tolerances



Individually indicated surface profile tolerances for location according to ISO 1101 and ISO 1660 and individually indicated positional tolerances according to ISO 5458, each related directly or indirectly to the general datum system RST and locking all degrees of freedom, overrule the general surface profile tolerances. See [Figure 2](#).



### 5.8 Rule H: Draft angle (taper)

The parting surface shall be indicated by the symbols  and  in accordance with ISO 10135.

There are three possible ways to indicate a draft angle (taper):

- a) as already included in the ideal model or drawing outlines;
- b) by the symbol ;
- c) by the symbol .

In case a), the general surface profile tolerance zone is located symmetrically to the nominal surface that includes the draft angles (tapers).

In case b), the general surface profile tolerance zone is located symmetrically to the surface when the draft angles (tapers) are added to the nominal model which excludes the draft angles in the tolerance zone; see [Figure 3 a](#)).

In case c), the general surface profile tolerance zone increases steadily as shown in [Figure 3 b](#)).

NOTE The rules for the indication of the symbols are given in ISO 10135.

When the draft angles (tapers) are already included in the nominal model or in the drawing outlines, "Draft angles included" shall be indicated in or near the drawing title block.

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