

---

---

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

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

*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*



This document is a preview generated by EUS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

<b>Foreword</b>	<b>v</b>
<b>Introduction</b>	<b>vi</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>2</b>
<b>4 Graphical symbols</b>	<b>5</b>
<b>5 Product definition type indicator</b>	<b>6</b>
5.1 Single and combined product definitions	6
5.2 Final moulded part product definitions	6
5.3 Intermediate machined moulded part product definitions	7
5.4 Final machined moulded part product definition	7
5.5 Identifier for machining by the supplier	7
<b>6 Product definition indications</b>	<b>8</b>
6.1 Surface texture symbols	8
6.2 Part condition identifiers	8
6.2.1 General	8
6.2.2 Surface texture	9
6.2.3 Linear sizes	10
6.2.4 Linear dimensions and individually indicated dimensional tolerances	10
6.2.5 Theoretically exact dimensions (TEDs)	10
6.2.6 Geometrical tolerances and datums	10
6.3 Required machining allowance (RMA)	12
6.3.1 General	12
6.3.2 General RMA	12
6.3.3 Individual RMA	12
6.4 Draft angles	12
<b>7 Indication of general tolerances</b>	<b>15</b>
7.1 General tolerances according to this document	15
7.2 General surface profile tolerance	15
<b>8 Types of specifications</b>	<b>15</b>
8.1 General	15
8.2 Specification of final moulded part condition	16
8.2.1 Overview of specification of final moulded part condition	16
8.2.2 Specification of final moulded part condition by the casting calculation method	16
8.2.3 Specification of final moulded part condition by the multiple tolerancing method	16
8.3 Specification of intermediate machined moulded part conditions	17
8.4 Specification of final machined moulded part condition	17
<b>9 Tolerancing</b>	<b>18</b>
9.1 General	18
9.2 Tolerancing of final moulded parts	18
9.2.1 Recommendations	18
9.2.2 Drafts	18
9.3 Tolerancing of intermediate machined moulded parts	18
9.4 Tolerancing of final machined moulded parts	19
9.4.1 General	19
9.4.2 Drafts	19
9.4.3 Multiple tolerancing method	19
<b>10 Rules</b>	<b>20</b>

10.1	Rule A: Application of general tolerances for castings .....	20
10.2	Rule B: General surface profile tolerances .....	20
10.3	Rule C: General datum system RST .....	20
10.4	Rule D: Tolerances overruling the general surface profile tolerances .....	20
10.5	Rule E: Additional tolerances .....	21
10.6	Rule F: Machined condition .....	21
10.7	Rule G: Required machining allowances (RMA) .....	21
10.8	Rule H: Draft angle (taper) .....	22
10.9	Rule I: Wall thickness .....	22
<b>11</b>	<b>General tolerances .....</b>	<b>22</b>
<b>12</b>	<b>Required machining allowances (RMAs) .....</b>	<b>24</b>
<b>13</b>	<b>Draft angles .....</b>	<b>24</b>
<b>14</b>	<b>General product definition indication .....</b>	<b>27</b>
<b>Annex A</b> (normative)	<b>Proportions and dimensions of graphical symbols .....</b>	<b>29</b>
<b>Annex B</b> (informative)	<b>Proposed process for general tolerancing castings .....</b>	<b>32</b>
<b>Annex C</b> (informative)	<b>Examples for the multiple tolerancing method .....</b>	<b>33</b>
<b>Annex D</b> (informative)	<b>Drawing examples .....</b>	<b>35</b>
<b>Annex E</b> (informative)	<b>Selection of general tolerances .....</b>	<b>41</b>
<b>Annex F</b> (informative)	<b>Selection of required machining allowances (RMA) .....</b>	<b>42</b>
<b>Annex G</b> (informative)	<b>Example of using general tolerances .....</b>	<b>43</b>
<b>Annex H</b> (normative)	<b>Calculation of the nominal dimension of the moulded condition — casting calculation method .....</b>	<b>46</b>
<b>Annex I</b> (informative)	<b>Relationship to the GPS matrix model .....</b>	<b>49</b>
<b>Bibliography</b> .....		<b>50</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 of 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 8062-4:2017), which has been technically revised.

The main changes are as follows:

- overall clarification regarding better applicability according to the ISO GPS system;
- overall revision of tables and figures for plausibility;
- new symbols for draft angles with symmetrical/unsymmetrical tolerance zones as already included in the model geometry or drawing outlines have been added;
- requirements for the indication in the product definition (new [Clauses 5, 6](#) and [7](#)) and types of specifications (new [Clause 8](#)) have been added;
- Rule I concerning the wall thickness has been added;
- [Clause 9](#) and [Annex G](#) have been added, expanding the information previously given in former Annex A;
- new [Annexes A, B](#) and [C](#) have been added;

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This document is a geometrical product specification (GPS) standard and is to be regarded as a complementary ISO GPS standard. It influences chain link B of the chain of standards on size, form, orientation and location.

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 I](#).

This document gives terms and definitions and symbols for product definition indications for tolerancing of moulded parts, which are to be used in addition to the usual standards on geometrical product specifications (GPS), such as ISO 1101, ISO 5458 and ISO 5459.

According to this document,  $\pm$  tolerances are only used for sizes and the following non-features of size: wall thicknesses, fillets and chamfers. Positional tolerances are also applied for sizes specified with  $\pm$  tolerances. For all other tolerancing purposes, geometrical tolerances according to ISO 1101 are used. For all other non-features of size, such as step dimension,  $\pm$  tolerances are not recommended. See the ISO 14405 series for background information.

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 ISO GPS standards to apply the rules for calculating 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 ISO GPS rules (e.g. ISO 14405-2).

The general tolerances of ISO 8062-4 are not in compliance with the rules of ISO 22081 with respect to the general geometrical tolerancing.

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 anymore when only the CAD model is available. To avoid these problems this document was developed as a parallel approach fully conforming with the ISO GPS rules given in, for example, ISO 14405-2 by introducing profile tolerancing and a datum system.

If there is no datum system specified or if the datum surfaces are to be machined after moulding then only ISO 8062-3 can be applied.

For the development of a new product, it is strongly recommended that customer and foundry should discuss and agree on the method of tolerancing to be applied to the product. This also includes casting method, calculation methods, cast material and draft angles, which are crucial for the process.

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

## Part 4:

## Rules and general tolerances for castings using profile tolerancing in a general datum system

### 1 Scope

This document specifies the rules for geometrical dimensioning and tolerancing of final moulded parts and parts machined out of moulded parts. It also specifies rules and conventions for the indications of these requirements in technical product documentation and specifies the proportions and dimensions of the graphical symbols to be used.

This document provides symbols for identifying the relative completeness of the moulded features and parts. These graphical symbols differ from the graphical symbols for surface texture according to ISO 1302<sup>1)</sup>, which are notably larger.

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.

This document establishes the general principles for presentation of general geometrical tolerances that apply to 2D technical drawings in all disciplines and trades but which are also applicable to 3D applications.

NOTE All figures are shown in 2D views only.

When cast datum surfaces are machined, this document is not applicable.

### 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 129-1, *Technical product documentation (TPD) — Presentation of dimensions and tolerances — Part 1: General principles*

ISO 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 1302,<sup>1</sup> *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

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)*

1) Cancelled and replaced by ISO 21920-1.



ISO 5458, *Geometrical product specifications (GPS) — Geometrical tolerancing — Pattern and combined geometrical specification*

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

ISO 7083, *Technical product documentation — Symbols used in technical product documentation — Proportions and dimensions*

ISO 8015, *Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules*

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

ISO 8785, *Geometrical Product Specification (GPS) — Surface imperfections — Terms, definitions and parameters*

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*

ISO 13715, *Technical product documentation — Edges of undefined shape — Indication and dimensioning*

ISO 14405-1, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 1: Linear sizes*

ISO 14405-2, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 2: Dimensions other than linear or angular sizes*

ISO 14405-3, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 3: Angular sizes*

ISO 16792, *Technical product documentation — Digital product definition data practices*

ISO 21204, *Geometrical product specifications (GPS) — Transition specification*

ISO 22081, *Geometrical product specifications (GPS) — Geometrical tolerancing — General geometrical specifications and general size specifications*

ISO 81714-1, *Design of graphical symbols for use in the technical documentation of products — Part 1: Basic rules*

### 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 10135, ISO 10579 and ISO 16792 and the following apply.

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

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

#### 3.1 moulded feature

feature of a moulded part which has not been machined