Date: ~~2022-09-22~~ **2023-01-13**

ISO/FDIS 8062--4:~~2022~~ 2023(E)

ISO/TC 213/WG 9

Secretariat: BSI

Geometrical product specifications — 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

ISO/FDIS 8062-4:2023(E)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/FDIS 8062-4
https://standards.iteh.ai/catalog/standards/sist/c5d2b40e-a33e-4cc8-ba8a-c4d018bfa7d7/iso-fdis-8062-4

Contents   Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/FDIS 8062-4
https://standards.iteh.ai/catalog/standards/sist/c5d2b40e-a33c-4cc8-ba8a-c4d018bfa7d7/iso-fdis-8062-4

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).

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).

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.

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 ~~to the previous edition~~ 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 ~~"Tolerancing"~~ and ~~informative~~ Annex G ~~"Example of using general tolerances" has~~have been added, expanding the information previously given in former ~~informative~~ Annex A ~~"Concept of general tolerancing";~~

— ~~The~~ — new ~~normative Annex A "Proportions and dimensions of graphical symbols" has been added;~~

~~New informative~~ Annexes A, B ~~"Proposed process of general tolerancing castings"~~ and C ~~"Examples for the multiple tolerancing method"~~ 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/FDIS 8062-4
https://standards.iteh.ai/catalog/standards/sist/c5d2b40e-a33e-4cc8-ba8a-c4d018bfa7d7/iso-
fdis-8062-4

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 ~~mouldings~~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, ± 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 ± tolerances. For all other tolerancing purposes, geometrical tolerances according to ISO 1101 are used. For all other non-features of size, ~~e.g.~~such as step dimension, ± 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 (±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 ~~any more~~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.

ISO/FDIS 8062-4

https://standards.iteh.ai/catalog/standards/sist/c5d2b40e-a33e-4cc8-ba8a-c4d018bfa7d7/iso-
fdis-8062-4

Geometrical product specifications — 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,[1] 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,[1] *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

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

---

[1] Cancelled and replaced by ISO 21920-1.

1

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 — Pattern and combined geometrical specification*

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

ISO 7083, *Technical ~~drawings~~product documentation — Symbols ~~for geometrical tolerancing~~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 ~~Specifications~~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 ~~terminological~~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

3.2
intermediate machined feature
feature of a moulded part which has undergone some machining and which subsequently will be machined to its final condition

Note 1 to entry: An intermediate machined feature is typically a roughly machined *moulded feature* (3.1).

Note 2 to entry: An intermediate machined feature can be used as a datum for subsequent machining of the moulded part.

3.3
final machined feature
feature of a moulded part which has been machined to its final condition

3.4
final moulded part
moulded part after fettling (if any)

Note 1 to entry: A final moulded part only consists of features which are moulded and have not been finished except by fettling.

3.5
intermediate machined moulded part
moulded part which has undergone some machining and which subsequently will be machined to its final condition

Note 1 to entry: An intermediate machined moulded part consists of at least one *moulded feature* (3.1) to be subsequently machined or at least one *intermediate machined feature* (3.2). In addition, it consists of moulded features not to be machined (if any) and *final machined features* (3.3) (if any).

Note 2 to entry: An intermediate machined moulded part can be produced from a *final moulded part* (3.4) or from another intermediate machined moulded part.

3.6
final machined moulded part
moulded part which has been machined to its final condition

Note 1 to entry: A final machined moulded part consists of *final machined features* (3.3) and can include *moulded features* (3.1) not to be machined. A final machined moulded part cannot include intermediate machined moulded features.

Note 2 to entry: A final machined moulded part can be produced from a *final moulded part* (3.4) or from an *intermediate machined moulded part* (3.5).

3.7
moulded part condition
manufacturing stage of a moulded part

Note 1 to entry: Listed in chronological order of manufacturing, a moulded part can be in a *final moulded part* (3.4) condition, *intermediate machined moulded part* (3.5) condition or *final machined moulded part* (3.6) condition.

3

Note 2 to entry: Only one final moulded part condition exists.

Note 3 to entry: Various intermediate machined moulded part conditions can exist.

Note 4 to entry: Only one final machined moulded part condition can exist.

Note 5 to entry: A moulded part does not need to exist in an intermediate machined moulded part condition before the final machined moulded part condition.

Note 6 to entry: Heat treatment or straightening (correction of unintended distortion) can be carried out in any moulded part condition.

3.8
product definition
PD
<of a moulded part> drawing or a 3D model representing the product

3.9
single product definition
product definition (3.8) of a moulded part giving requirements for one *moulded part condition* (3.7) only

3.10
combined product definition
product definition of a moulded part giving requirements for more than one *moulded part condition* (3.7)
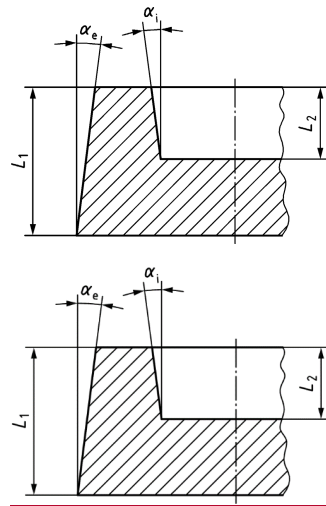
3.11
draft angle
taper
value of inclination (angle) that is added to a geometrical feature of a pattern or mould to ensure the removal of the pattern or moulded part from the mould

3.12
external draft angle
draft angle (3.11) on a surface that has no opposite surface in the direction outward of the part

Note 1 to entry: See Figure 1.

3.13
internal draft angle
draft angle (3.11) on a surface that has an opposite surface in the direction outward of the part

Note 1 to entry: See Figure 1.

Key

L_1 ~~L_1~~	length of the external feature
L_2 ~~L_2~~	length of the internal feature
α_e ~~α_e~~	external draft angle
α_i ~~α_i~~	internal draft angle

Figure 1 — External and internal draft angles

3.14
~~**single inclination symbol**~~
~~symbol indicating the nominal model by the stated *draft angle* (3.11) with symmetrical tolerance zone increasing the geometrical model feature(s) draft angle which is part of the model geometry~~

~~Note 1 to entry: See Figure 17c).~~

~~**3.15**~~
draft angle increasing the tolerance of feature(s)
draft angle (3.11) which is added to the model geometry and included in the tolerance zone

Note 1 to entry: See Figure 17 d).

3.~~16~~15
general datum system RST
datum system according to ISO 5459, locking all degrees of freedom and used for the general tolerance.

Note 1 to entry: Annex G provides an example of using general tolerances. For the general datum system RST, see Figure G.2.

Note 2 to entry: It is recommended ~~to use~~that the datum feature identifiers R, S, and T are used for the general datum systems for moulded parts.

Note 3 to entry: It is recommended that a datum target system RST is used, see Figure G.1.

Note 4 to entry: The datum letters R, S, T are reserved for the general datum system, see 10.3.

3.~~17~~16
wall thickness
minimum dimension between two surfaces (external and internal) enclosing solid material

Note 1 to entry: The surface ~~could~~can be planar, cylindrical, complex ~~surfaces~~ or any ~~combinations~~combination thereof.
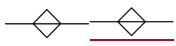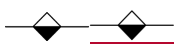
~~5   Symbols~~

4   Graphical symbols

Table 1 gives an overview of the graphical symbols used in this document~~, with their~~. Their proportions and dimensions ~~being~~shall be as specified in Annex A.

Table ~~— Symbols~~1 — Graphical symbols

Symbol	Description	Source
∨ ∨	moulded ~~surface ᵃ~~surfaceᵃ	ISO 1302
∨ ∨	machined ~~surface ᵃ~~surfaceᵃ	ISO 1302
√ √	moulded or machined ~~surface ᵃ~~surfaceᵃ	ISO 1302
⌒ ⌒	surface profile tolerance	
⊕ ⊕	positional tolerance	ISO 1101
100 100	theoretically exact dimension	
►─ A │A1, 2, ►─ A │A1, 2, 3	datum of datum target	
A1 A1 A1 A1	datum target, fixed, movable	ISO 5459
Surfaces without tolerance indication: ⌒ 0,5 R S T	indication of general tolerance	10.1, 10.2, 10.3
⌒ 0,5 R S T		

◇——— ◇———	parting surface	ISO 10135
◆——— ◆———	parting surface movable fixed	
◒◒	indication of draft angle with symmetrical tolerance zone as already included in the model geometry or drawing outlines	6.4
◓◒	indication of a draft angle with unsymmetrical tolerance zone as already included in the model geometry or drawing outlines	6.4
▷▷	draft angle with symmetrical tolerance zone	ISO 10135
▶▶	draft angle with unsymmetrical tolerance zone	6.4
⊘⊘	moulded condition	5.2
▼▼	intermediate (pre)machined	5.3
▽▽	final machined	5.4
SUP SUP	machining by supplier	5.5
ᵃ New symbols for surface roughness in accordance with the ISO 21920 series are being prepared.		

6̶5 Product definition type indicator

6̶.̶1̶5.1 Single and combined product definitions

The requirements for the three types of moulded part conditions (final moulded, intermediate machined moulded and final machined moulded) can be specified on a combined product definition or separately on single product definitions, as appropriate.

NOTE   Some CAD systems allow the representation of multiple types of moulded part conditions in one CAD model.

If use of the symbols in this document makes a combined product definition difficult to read, use single product definitions instead.

Information as to which part condition or conditions the stated specifications on the product definition apply shall be indicated on the product definition in accordance with 5.2, 5.3, 5.4 and 5.5. Therefore, the product definition shall indicate which part condition(s) the stated specification applies to.

On combined product definitions, only the outline of the most advanced part condition for which the product definition is valid shall be illustrated. Requirements for the most advanced condition and for the preceding moulded part condition in question shall be stated.