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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

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

Partie 4: Tolérances générales pour les moules (selon les règles GPS)

ICS: 17.040.10

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

ISO 8062 consists of the following parts, under the general title *Geometrical product specifications (GPS) — Dimensional and geometrical tolerances for moulded parts*:

- *Part 1: Vocabulary*
- *Part 2: Drawing indications for moulded parts to be machined*
- *Part 3: General dimensional and geometrical tolerances and machining allowances for castings*
- *Part 4: General tolerances for castings using profile tolerancing in a general datum system*

Introduction

This part of ISO 8062 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 castings.

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

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, draft angle grades and machining allowance grades for cast metals and their alloys.

ISO/TS 8062-2:2013 states in relation to the accumulation method where general dimensional tolerances according to ISO 8062-3 are used:

“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) apply not only to sizes but also to centre distances and dimensions defining profile contours. This is in contradiction to ISO 14405-2.

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.

This standard, ISO 8062-4, avoids the insufficiencies of ISO 8062-3 and is in full compliance with the GPS rules.

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 part of ISO 8062 specifies general geometrical tolerances, machining allowances and draft angles for castings in all cast metals and their alloys produced by various casting manufacturing processes.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 according to ISO 1101, ISO 1660, ISO 2692, ISO 5458, ISO 5459, ISO 8062-1, ISO/TS 8062-2, ISO 10135, ISO 10579, and the following terms and definitions apply.

3.1

draft value

<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

3.1.1

external draft value

draft value (3.1.1) on a surface that has no opposite surface in the direction outward of the part

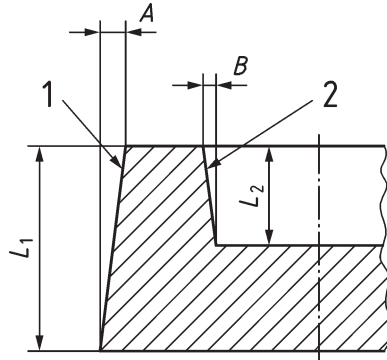
Note 1 to entry: See [Figure 1](#).

3.1.2

internal draft value

draft value (3.1.1) on a surface that has an opposite surface in the direction outward of the part

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



Key

- 1 external draft value
- 2 internal draft value

Figure 1 — External and internal draft values

3.2

datum system RST

ISO 5459 datum system with the datum letters

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

3.3

datum target system RST

ISO 5459 datum system consisting of datum targets with the datum letters

R	S	T
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Note 1 to entry: See [Figure 2](#).

4 Rules

4.1 Rule A: Application of general tolerances for castings

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

- a) the moulded condition only;
- 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 datum system RST on surfaces remaining as moulded, see Rule C.

4.2 Rule B: General profile surface tolerances

The general tolerances according to this standard are profile surface tolerances related to a general datum target system RST according to ISO 1101 and ISO 1660, see Rule C.

They apply to all surfaces with the exception of Rule D.

4.3 Rule C: General datum system

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

When a general datum target system RST is used (recommended), the general profile tolerances according to [Table 1](#) apply also to the datum features.

When an integral datum system RST is used, the general profile tolerances according to [Table 1](#) do not apply to the datum features; they shall be toleranced separately by:

- an unrelated profile 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 moulded condition, this part of ISO 8062 cannot be applied.

4.4 Rule D: Tolerances overruling the general profile surface tolerances

Individually indicated profile surface 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 or parts of it, overrule the general profile surface tolerances. See [Figure 2](#).

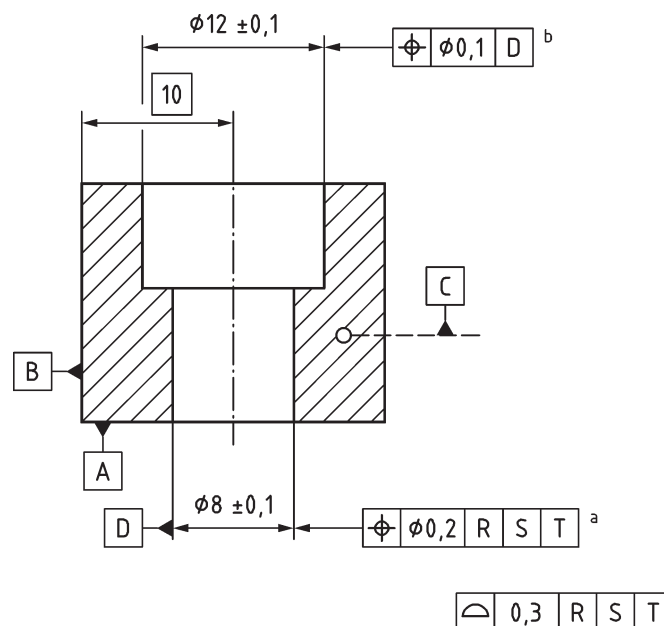


Figure 2 — Locational tolerances directly a) and indirectly b) related to the general datum system RST

When positional tolerances for sizes are used, the (dimensional) size tolerance shall be specified in addition.

4.5 Rule E: Additional tolerances

Other tolerances than those described in rules B and D (not related to the general datum system RST) apply in addition to the general tolerances as further restrictions.

4.6 Rule F: Machined condition (application case c)

The final machined condition shall be possible to be achieved.

When the tolerances for the machined surfaces are related to datums or datum systems different from the general datum system RST, additional material is needed for the moulded condition is required.

Due to the inclination and offset of the datum system RST of the moulded condition relative to the datum system of the machined condition, the amount of additional material shall be calculated from the geometrical tolerance of the datum surfaces of the machined condition relative to the general datum target system RST.

NOTE When the general datum target system RST for the moulded condition is missing (there is only a datum system defined on machined surfaces), this part of ISO 8062 cannot be applied.

4.7 Rule G: Required machining allowances (RMA)

Surfaces to be machined require a machining allowance RMA. The RMA shall be selected from [Table 2](#) and shall be indicated on the drawing. For information on the selection of RMAs, see [Annex C](#).



The RMA applies to all surfaces to be machined the same unless a different RMA is individually indicated to a specific surface (according to ISO 1302).

[Annex E](#) gives examples for the calculation of the dimension of the moulded condition (raw dimension).

4.8 Rule H: Taper

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

There are 3 possible ways to indicate taper:

- a) as already included in the nominal model;
- b) by the symbol ;
- c) by the symbol .

In case a), the general profile surface tolerance zone is located symmetrically to the nominal surface.

In case b), the general profile surface tolerance zone is located symmetrically to the surface when the taper is added to the nominal model.

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

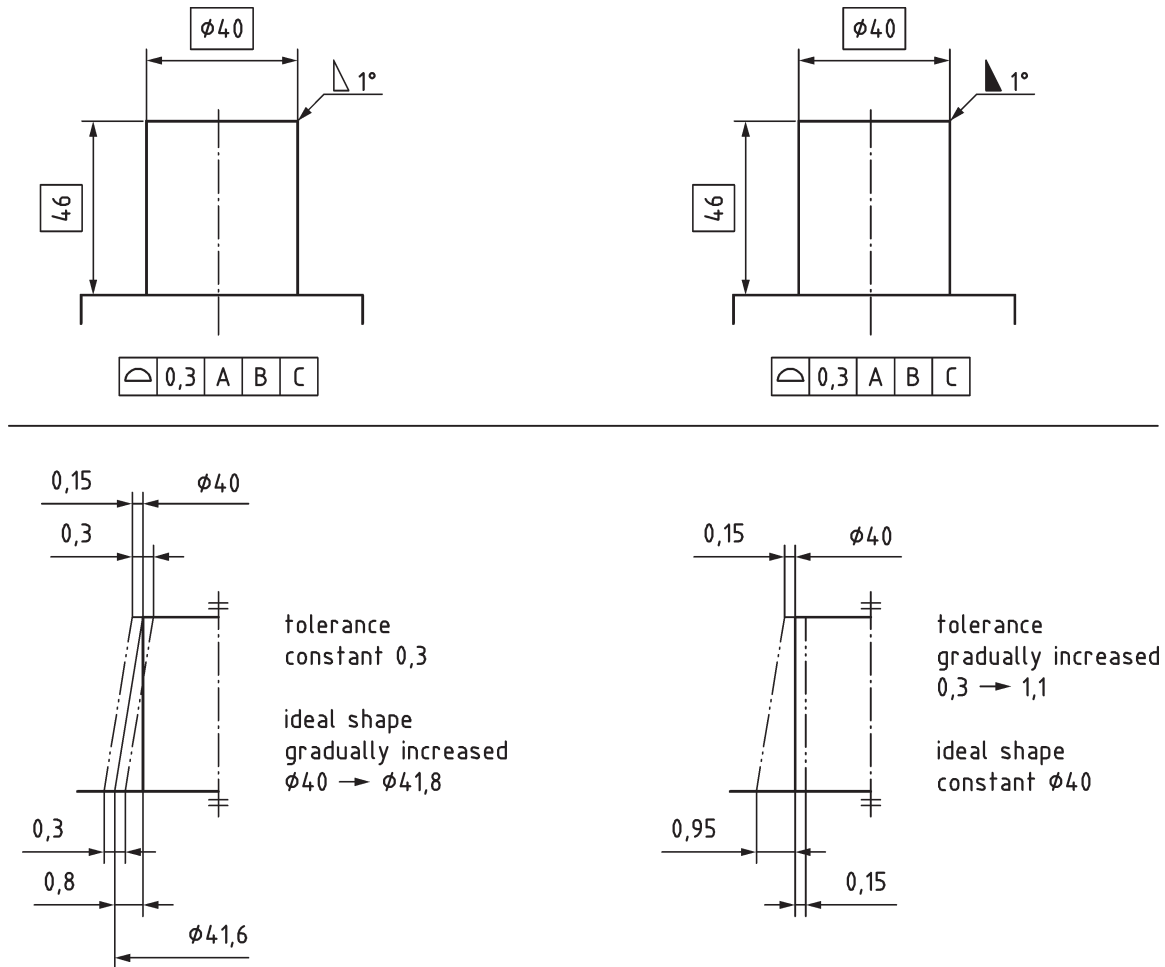


Figure 3 — Taper, tolerance zones

Unless otherwise indicated, taper plus shall apply. The exception to this rule is for features with the maximum material requirement specified according to ISO 2692, where taper minus shall apply.

5 General tolerances

[Table 1](#) gives the general profile surface tolerances for the moulded condition of castings. The tolerances are related to the sizes of the nominal models (not considering taper) of the castings (diameter of the smallest enveloping sphere). See [Annex A](#) for more information.

NOTE This tolerance is constant throughout the casting.

Table 1 — General profile surface tolerances for the moulded condition of castings

Dimensions in mm

Casting size ^a		General profile surface tolerances for tolerance grades P ^b														
above	up to, including															
<	≤	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
—	10	0,09	0,14	0,19	0,27	0,37	0,53	0,76	1,1	1,6	2,1	2,9	4,3	—	—	—
10	30	0,12	0,16	0,23	0,31	0,44	0,61	0,86	1,3	1,8	2,5	3,4	4,8	6,5	8,5	10,5
30	100	0,14	0,19	0,27	0,38	0,53	0,74	1,1	1,5	2,1	3	4,2	5,8	8,5	10,5	13
100	300	0,15	0,23	0,35	0,5	0,7	1	1,4	2	2,8	4	5,6	8	11	14	18
300	1 000	—	—	0,42	0,64	0,8	1,3	1,9	2,7	3,8	5,5	7,5	10,5	15	19	23,5
1 000	3 000	—	—	—	—	—	1,6	2,4	3,8	5,4	8	10	15	21	26	33
3000	6300	—	—	—	—	—	—	—	—	7	10	13	19	26	33	41
6300	10000	—	—	—	—	—	—	—	—	—	11	16	23	32	40	50

^a Diameter of smallest enveloping sphere of nominal contour in the moulded condition (space diagonal).
^b Mismatch (see ISO 10135) within profile surface tolerance.

For casting sizes over 3 000 mm the general profile tolerances shall be agreed upon.

Unless otherwise indicated, surface mismatch is included in the general profile surface tolerance.

For the application of taper see Rule H.

For cylindrical sizes, as a further restriction (see Rule E), the values given in [Table 2](#) apply as dimensional tolerances. Unless otherwise specified, \pm of half the values apply.

For sizes established by two opposite parallel planes these tolerances apply when the dimension is explicitly indicated in the drawing.

NOTE 1 The values are related to the nominal values of the sizes in the moulded condition.

For wall thicknesses, as a further restriction (see Rule E), the values given in [Table 2](#) apply as dimensional tolerances. Unless otherwise specified, \pm of half the values apply. Unless otherwise specified, one grade coarser than for sizes shall apply.

NOTE 2 The values are related to the nominal values of the wall thickness in the moulded condition.

Table 2 — General dimensional tolerances for sizes of complete cylinders and for wall thicknesses

Dimensions in mm

Casting size ^a		General dimensional tolerances for tolerance grades S														
above	up to, including															
<	≤	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
—	10	0,05	0,06	0,1	0,12	0,17	0,25	0,35	0,5	0,7	1	1,4	2	—	—	—
10	30	0,06	0,07	0,12	0,15	0,2	0,3	0,4	0,6	0,8	1,2	1,7	2,5	3	4	5
30	100	0,07	0,1	0,14	0,2	0,25	0,4	0,5	0,8	1	1,5	2	3	4	5	7
100	300	0,08	0,12	0,17	0,25	0,35	0,5	0,7	1	1,4	2	3	4	5	7	9

^a Size or wall thickness of the nominal contour in the moulded condition.

There are cases where the calculation of the moulded dimension using tolerances according to [Table 1](#) or [Table 2](#) leads to two different results (a larger and a smaller dimension tolerance). In such cases, the smaller dimensional tolerance applies.

6 Required machining allowances

The required machining allowances (RMA) are given in [Table 3](#). The RMA are given in RMA grades according to the manufacturing needs, see [Annex C](#).

Table 3 — Required machining allowance grades

Overall dimension		RMA grades									
in mm											
above	up to, including	A	B	C	D	E	F	G	H	J	K
<	≤										
—	40	0,1	0,1	0,2	0,3	0,4	0,5	0,5	0,7	1	2
40	63	0,1	0,2	0,3	0,3	0,4	0,5	0,7	1	1,4	3
63	100	0,2	0,3	0,4	0,5	0,7	1	1,4	2	2,8	4
100	160	0,3	0,4	0,5	0,8	1,1	1,5	2,2	3	4	6
160	250	0,3	0,5	0,7	1	1,4	2	2,8	4	5,5	8
250	400	0,4	0,7	0,9	1,3	1,8	2,5	3,5	5	7	10
400	630	0,5	0,8	1,1	1,5	2,2	3	4	6	9	12
630	1 000	0,6	0,9	1,2	1,8	2,5	3,5	5	7	10	14
1 000	1 600	0,7	1	1,4	2	2,8	4	5,5	8	11	16
1 600	3 000	0,8	1,1	1,6	2,2	3,2	4,5	6	9	13	18
3000	6300	1	1,4	2	2,8	4	5,5	8	11	16	22
6300	10000	1,1	1,5	2,2	3	4,5	6	9	12	17	24

NOTE The number overall dimension graduations are greater than in [Tables 1](#) and [2](#), in order to avoid excess material.

7 Draft angles (taper)

If indicated in the general drawing indication, see [Clause 8](#), and if not otherwise individually indicated, the draft angles (taper) according to [Tables 4](#) to [8](#) apply.

They apply to the, in the direction of taper, longer feature. For the shorter feature, if any, taper to fit applies, see ISO 10135. The taper applies as continuously increasing the tolerance (not increasing the nominal shape).

In order to identify the tapered surfaces, the parting surface is to be indicated according to ISO 10135.

Table 4 — Draft angles for hand moulding casting

Height range of feature for draft value		Grade A (DA)		Grade B (DB)	
in mm		External	Internal	External	Internal
above	up to, including				
<	≤				
0	4	6,9° (0,4 mm)	8,3° (0,5 mm)	8,8° (0,6 mm)	10,7° (0,7 mm)
4	6,3	6,5° (0,6 mm)	7,5° (0,7 mm)	5,2° (0,7 mm)	9,3° (0,8 mm)
6,3	10	4,8° (0,7 mm)	5,4° (0,8 mm)	5,7° (0,8 mm)	7,5° (1,0 mm)
10	16	3,2° (0,7 mm)	4,1° (0,9 mm)	4,7° (1,0 mm)	5,7° (1,3 mm)
16	25	2,6° (0,9 mm)	3,0° (1,1 mm)	3,2° (1,1 mm)	4,4° (1,6 mm)
25	40	2,2° (1,1 mm)	2,9° (1,6 mm)	3,0° (1,5 mm)	4,1° (2,2 mm)
40	63	1,9° (1,5 mm)	2,4° (2,1 mm)	2,6° (2,1 mm)	3,3° (2,8 mm)
63	100	1,4° (1,8 mm)	2,0° (2,6 mm)	2,0° (2,4 mm)	2,7° (3,6 mm)
100	160	1,0° (2,2 mm)	1,5° (3,2 mm)	1,4° (3,0 mm)	2,0° (4,3 mm)
160	250	0,8° (2,8 mm)	1,2° (4,0 mm)	1,2° (4,0 mm)	1,6° (5,5 mm)
250	400	0,7° (3,1 mm)	0,9° (5,0 mm)	0,9° (4,5 mm)	1,3° (6,8 mm)
400	630	0,5° (4,7 mm)	0,8° (6,5 mm)	0,7° (6,3 mm)	1,0° (8,7 mm)
630	1 000	0,5° (7,0 mm)	0,7° (9,0 mm)	0,7° (9,5 mm)	0,9° (12,5 mm)
1 000	1 600	0,4° (9,0 mm)	0,5° (11,5 mm)	0,5° (11,5 mm)	0,7° (14,5 mm)

Table 5 — Draft angles for machine moulding casting

Height range of feature for draft value		Grade A (DA)		Grade B (DB)	
in mm		External	Internal	External	Internal
above	up to, including				
<	≤				
0	4	5,8° (0,4 mm)	6,8° (0,5 mm)	7,4° (0,5 mm)	8,6° (0,6 mm)
4	6,3	5,3° (0,5 mm)	6,0° (0,5 mm)	6,7° (0,6 mm)	7,5° (0,7 mm)
6,3	10	3,9° (0,5 mm)	4,4° (0,6 mm)	4,7° (0,7 mm)	6,0° (0,8 mm)
10	16	2,7° (0,6 mm)	3,2° (0,7 mm)	3,9° (0,9 mm)	4,5° (1,0 mm)
16	25	2,2° (0,8 mm)	2,5° (0,9 mm)	2,8° (1,0 mm)	3,5° (1,2 mm)
25	40	2,0° (1,1 mm)	2,4° (1,3 mm)	2,7° (1,5 mm)	3,3° (1,8 mm)
40	63	1,6° (1,4 mm)	1,9° (1,7 mm)	2,0° (1,8 mm)	2,6° (2,2 mm)
63	100	1,2° (1,7 mm)	1,6° (2,1 mm)	1,6° (2,2 mm)	2,2° (3,0 mm)
100	160	1,0° (2,3 mm)	1,3° (2,8 mm)	1,3° (2,9 mm)	1,8° (3,9 mm)
160	250	0,9° (3,0 mm)	1,1° (3,9 mm)	1,2° (4,1 mm)	1,6° (5,4 mm)
250	400	0,8° (4,3 mm)	1,0° (5,4 mm)	1,1° (5,8 mm)	1,4° (7,4 mm)
400	630	0,7° (6,2 mm)	0,9° (7,7 mm)	0,9° (7,9 mm)	1,1° (9,8 mm)
630	1 000	0,5° (7,0 mm)	0,7° (9,0 mm)	0,7° (9,5 mm)	0,9° (12,5 mm)
1 000	1 600	0,4° (9,0 mm)	0,5° (11,5 mm)	0,5° (11,5 mm)	0,7° (14,5 mm)

Table 6 — Draft angles for permanent moulding casting

Height range of feature for draft value		Grade A (DA)		Grade B (DB)	
in mm		External draft value	Internal draft value	External draft value 2	Internal draft value 2
above	up to, including				
<	≤				
—	4	8,5° (0,3 mm)	11,3° (0,4 mm)	11,3° (0,4 mm)	11,3° (0,4 mm)
4	6,3	3,3° (0,3 mm)	5,6° (0,5 mm)	5,6° (0,5 mm)	5,6° (0,5 mm)
6,3	10	3,5° (0,5 mm)	4,9° (0,7 mm)	4,9° (0,7 mm)	5,6° (0,8 mm)
10	16	3,1° (0,7 mm)	1,4° (1,0 mm)	3,5° (0,8 mm)	5,3° (1,2 mm)
16	25	2,8° (1,0 mm)	3,9° (1,4 mm)	3,4° (1,2 mm)	4,5° (1,6 mm)
25	40	2,5° (1,4 mm)	3,5° (2,0 mm)	3,2° (1,8 mm)	4,1° (2,3 mm)
40	63	2,2° (2,0 mm)	2,8° (2,5 mm)	2,8° (2,5 mm)	3,6° (3,2 mm)
63	100	1,8° (2,5 mm)	2,8° (4,0 mm)	2,5° (3,6 mm)	3,2° (4,5 mm)
100	160	1,8° (4,0 mm)	2,2° (5,0 mm)	1,6° (5,0 mm)	2,6° (6,0 mm)
160	250	1,7° (6,0 mm)	1,8° (6,5 mm)	2,0° (7,0 mm)	2,2° (8,0 mm)
250	400	1,4° (8,0 mm)	1,6° (9,0 mm)	1,6° (9,0 mm)	1,8° (10,0 mm)
400	630	1,2° (11,0 mm)	1,3° (12,0 mm)	1,3° (12,0 mm)	1,5° (13,0 mm)

Table 7 — Draft angles for pressure die casting

Height range of feature for draft value		Grade A (DA)		Grade B (DB)	
in mm		External draft value	Internal draft value	External draft value 2	Internal draft value 2
above	up to, including				
<	≤				
—	4	5,7° (0,2 mm)	8,5° (0,3 mm)	8,5° (0,3 mm)	11,3° (0,4 mm)
4	6,3	2,2° (0,2 mm)	3,3° (0,3 mm)	3,3° (0,3 mm)	5,6° (0,5 mm)
6,3	10	2,1° (0,3 mm)	2,8° (0,4 mm)	2,8° (0,4 mm)	4,9° (0,7 mm)
10	16	1,3° (0,3 mm)	2,2° (0,5 mm)	2,2° (0,5 mm)	4,0° (0,9 mm)
16	25	2,8° (0,4 mm)	2,0° (0,7 mm)	2,0° (0,7 mm)	3,4° (1,2 mm)
25	40	2,5° (0,7 mm)	2,1° (1,2 mm)	2,1° (1,2 mm)	3,5° (2,0 mm)
40	63	2,2° (1,0 mm)	1,7° (1,5 mm)	1,7° (1,5 mm)	2,8° (2,5 mm)
63	100	0,8° (1,2 mm)	1,4° (2,0 mm)	1,4° (2,0 mm)	2,5° (3,5 mm)
100	160	0,9° (2,0 mm)	1,3° (3,0 mm)	1,3° (3,0 mm)	2,2° (5,0 mm)
160	250	0,7° (2,5 mm)	1,1° (4,0 mm)	1,1° (4,0 mm)	2,0° (7,0 mm)
250	400	0,5° (3,0 mm)	0,9° (5,5 mm)	0,9° (5,5 mm)	1,6° (9,0 mm)
400	630	0,5° (4,0 mm)	0,8° (7,0 mm)	0,8° (7,0 mm)	1,2° (11,0 mm)

Table 8 — Draft angles for investment casting

Height range of feature for draft value		Grade A (DA)		Grade B (DB)	
in mm		External draft value	Internal draft value	External draft value 2	Internal draft value 2
above	up to, including				
<	≤				
—	4	5,7° (0,2 mm)	5,7° (0,2 mm)	5,7° (0,2 mm)	8,5° (0,3 mm)
4	6,3	2,2° (0,2 mm)	2,2° (0,2 mm)	2,2° (0,2 mm)	3,3° (0,3 mm)
6,3	10	1,4° (0,2 mm)	1,4° (0,2 mm)	1,4° (0,2 mm)	2,8° (0,4 mm)
10	16	0,9° (0,2 mm)	1,3° (0,3 mm)	1,3° (0,3 mm)	1,8° (0,4 mm)
16	25	0,8° (0,3 mm)	1,1° (0,4 mm)	1,1° (0,4 mm)	1,4° (0,5 mm)
25	40	0,5° (0,3 mm)	0,7° (0,4 mm)	0,7° (0,4 mm)	1,1° (0,6 mm)
40	63	0,5° (0,4 mm)	0,6° (0,5 mm)	0,6° (0,5 mm)	0,8° (0,7 mm)
63	100	0,3° (0,4 mm)	0,4° (0,6 mm)	0,4° (0,6 mm)	0,6° (0,8 mm)
100	160	0,2° (0,5 mm)	0,3° (0,7 mm)	0,3° (0,7 mm)	0,4° (0,9 mm)
160	250	0,2° (0,6 mm)	0,2° (0,8 mm)	0,2° (0,8 mm)	0,3° (1,0 mm)
250	400	0,1° (0,7 mm)	0,2° (0,9 mm)	0,2° (0,9 mm)	0,2° (1,2 mm)
400	630	0,1° (0,8 mm)	0,1° (1,0 mm)	0,1° (1,0 mm)	0,2° (1,5 mm)

NOTE The overall dimension rating is finer than that in [Tables 4 to 8](#), in order to avoid excess material.

8 General drawing indication

In order to apply the general tolerances according to this standard, the following items shall be specified in, or near to, the drawing title block:

- the number of this standard: ISO 8062-4;
- the general profile tolerance;
- the general tolerance grade for sizes;
- the general tolerance grade for wall thicknesses;
- the RMA value;
- manufacturing method together with the draft angle grade;
- the casting size $S\emptyset$ of smallest enveloping sphere;
- the part condition identifier(s).

e. g.: ISO 8062-4.

	2	R	S	T
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Sizes S8

Wall thicknesses S9

RMA-1,8

Machine moulding DB

Casting size SØ 750



Annex A (informative)

Concept of the general tolerancing

General tolerances according to this part of ISO 8062 are surface profile tolerances related to a datum target system RST. The datum target system is established by 6 datum targets for rigid workpieces and by a minimum of 6 datum targets for flexible workpieces. The datum targets are indicated in the drawing.

The general tolerances on surface profile apply in principle to all surfaces of the workpiece. In special cases, larger or smaller profile surface tolerances related to the same datum system may be individually indicated for particular surfaces. Individually specified tolerances directly or indirectly related to the general datum system or parts of it override the general tolerances.

For sizes, general positional tolerances related to the same datum target system RST may be specified, overruling the general profile surface tolerances.

Other individually indicated tolerances are complementary, i.e. they apply in addition as a further restriction to the general tolerances.

Dimensional tolerances (\pm tolerances) should only be used when necessary and only for diameters and widths (sizes) together with positional tolerances, and for wall thicknesses.

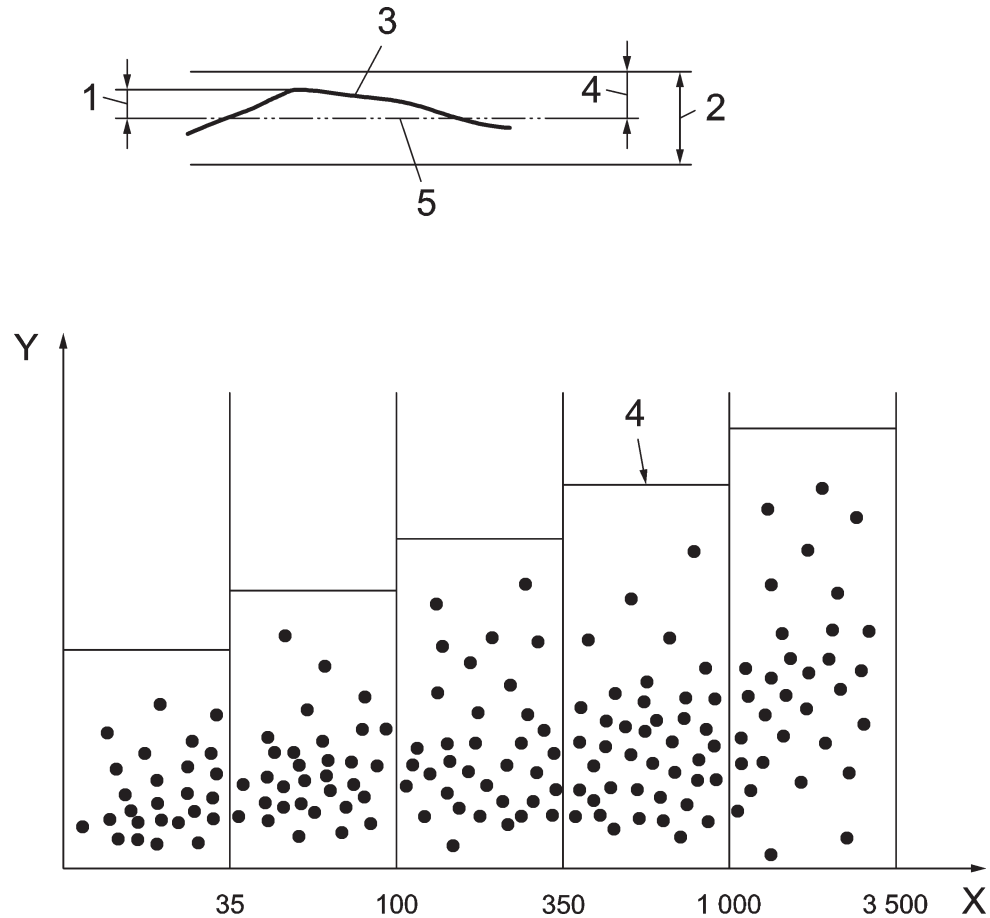
In order to achieve the full economic success, the general tolerances are to be respected without special effort and with a high probability. The corresponding amount of the general tolerances shall be derived from measurements on workpieces out of the normal production, see [Figure A.1](#).

According to this investigation, the general tolerances are to be selected from the tables of the standard.

By the use of general tolerances, the drawings become easier to read because there are fewer individually indicated tolerances. Manufacturing planners and inspectors can recognize the individually indicated tolerances. These are the tolerances where eventually special care is necessary. This facilitates an economic way of production.

The foundry should determine by measurements what its customary foundry accuracy is and accept only those drawings which have general tolerances equal to or larger than its customary foundry accuracy.

NOTE It is not the intention of the concept of general tolerancing to check every feature on every casting. Relying on the notion of undefined “good foundry”, with all its uncertainties and misunderstandings, is no longer necessary with the concept of general tolerances. The general tolerances define the required accuracy of “good foundry”.

**Key**

- 1 profile deviation
- 2 general profile tolerance
- 3 extracted feature (actual surface)
- 4 general profile deviation limit
- 5 theoretical exact feature (workpiece shape)

X workpiece overall size (smallest enveloping sphere diameter)

Y max. profile deviation of workpiece (measured)

Figure A.1 — General tolerances derived from measurements (the limit deviations correspond to half of the profile surface tolerances)

The tolerance that the function allows is often larger than the general tolerance. The function of the part is, therefore, not always impaired if the general tolerance is (occasionally) exceeded at any feature of the casting. Exceeding the general tolerance should lead to a rejection of the casting only if the function is impaired.

Annex B (informative)

Selection of general tolerances

See [Tables B.1](#) and [B.2](#).

Table B.1 — Tolerance grades P for general tolerances for long-series or mass production of castings

	Sand cast hand moulding	Sand cast machine mould and shell moulding	Metallic permanent mould	Pressure die casting	Investment casting
Steel	11 - 14	8 - 12	—	—	4 - 9
Grey iron	11 - 14	8 - 12	7 - 9	—	4 - 9
S. G. iron	11 - 14	8 - 12	7 - 9	—	4 - 9
Malleable iron	11 - 14	8 - 12	7 - 9	—	4 - 9
Copper alloys	10 - 13	8 - 10	7 - 9	6 - 8	4 - 9
Zinc alloys	10 - 13	8 - 10	7 - 9	3 - 6	4 - 9
Light metal alloys	9 - 12	7 - 9	6 - 8	6 - 9	4 - 9
Nickel based alloys	11 - 14	8 - 12	—	—	4 - 9
Cobalt based alloys	11 - 14	8 - 12	—	—	4 - 9

Table B.2 — Tolerance grades P for general tolerances for short-series or single production of castings

	Sand cast hand moulding	
	Clay-bonded	Chemically bonded
Steel	13 - 14	12 - 14
Grey iron	13 - 15	11 - 14
S. G. iron	13 - 15	11 - 14
Malleable iron	13 - 15	11 - 14
Copper alloys	13 - 15	10 - 13
Light metal alloys	11 - 13	10 - 13
Nickel based alloys	13 - 15	12 - 14
Cobalt based alloys	13 - 15	12 - 14

Annex C (informative)

Selection of required machining allowances (RMA)

	Sand cast hand moulding	Sand cast machine mould and shell moulding	Metallic permanent mould	Pressure die casting	Investment casting
Steel	G to K	F to H	—	—	E
Grey iron	F to H	E to G	D to F	—	E
S. G. iron	F to H	E to G	D to F	—	E
Malleable iron	F to H	E to G	D to F	—	—
Copper alloys	F to H	E to G	D to F	B to D	E
Zinc alloys	F to H	E to G	D to F	A to D	—
Light metal alloys	F to H	E to G	D to F	B to D	E
Nickel based alloys	G to K	F to H	—	—	E
Cobalt based alloys	G to K	F to H	—	—	—

Annex D (informative)

Example of using general tolerances

See [Figures D.1](#) and [D.2](#).

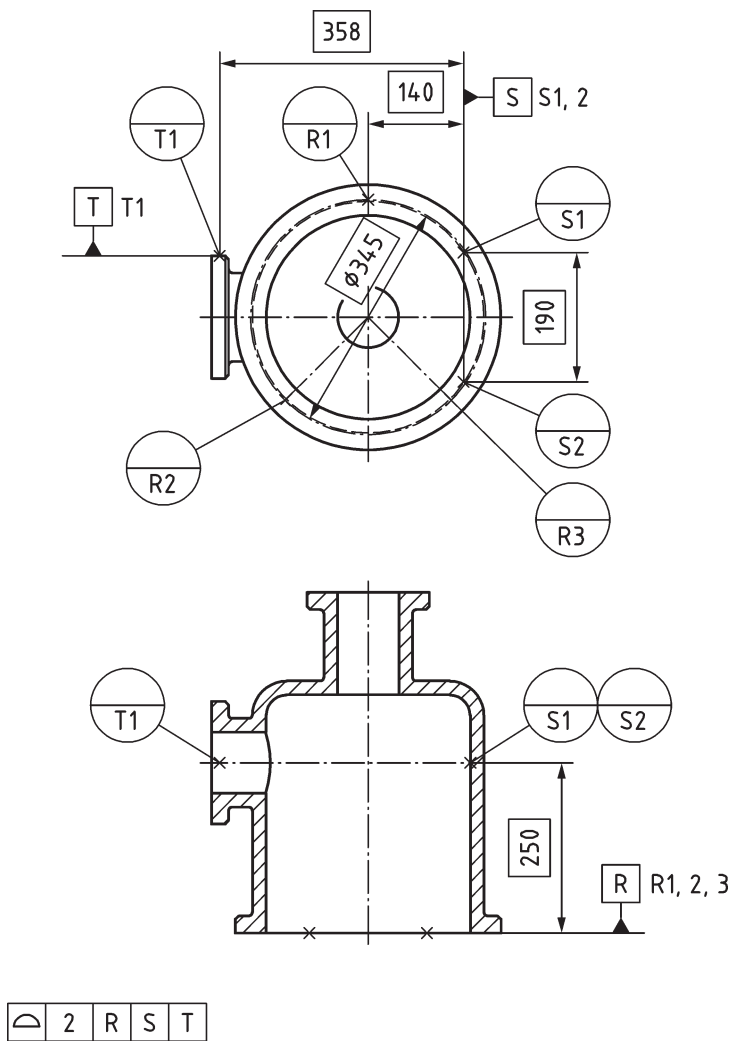
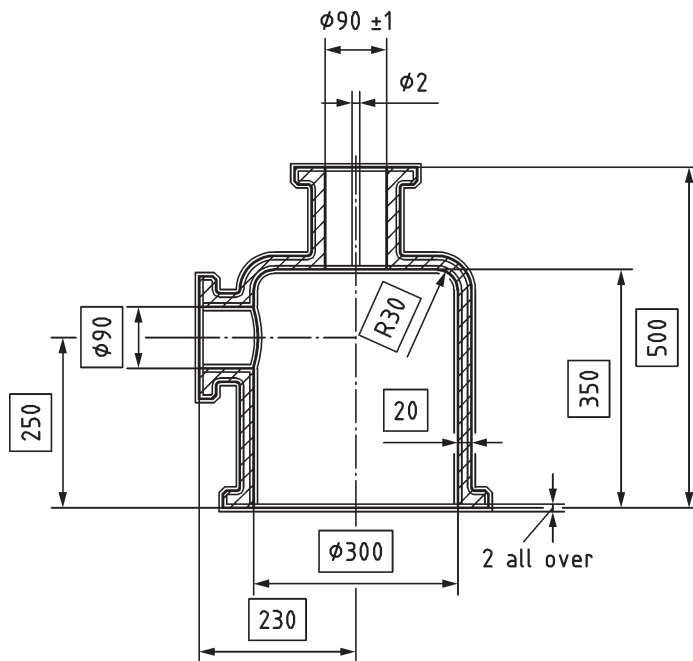


Figure D.1 — Datum target system, example



Exceptions from 2 all over:

top surface $\begin{matrix} \text{A} & 3 & \text{R} & \text{S} & \text{T} \end{matrix}$

left surface $\begin{matrix} \text{A} & 1 & \text{R} & \text{S} & \text{T} \end{matrix}$

top hole $\phi 90 \pm 1$ $\begin{matrix} \phi & \phi 2 & \text{R} & \text{S} & \text{T} \end{matrix}$

Additional restriction:

left hole $\begin{matrix} \text{A} & 1 \end{matrix}$

wall thicknesses $20 \pm 0,5$

b) Interpretation

Figure D.2 — Use of general tolerances with exceptions and additional further restrictions

General dimensional tolerances for cylindrical sizes are not required, regarding parting surface and draft angles the drawing is not complete. As there occurs only one wall thickness in the drawing, the general dimensional tolerance for wall thickness has been indicated directly; it corresponds to S9.

Annex E (informative)

Calculation of the nominal dimension of the moulded condition

See [Figures E.1](#) to [E.3](#).

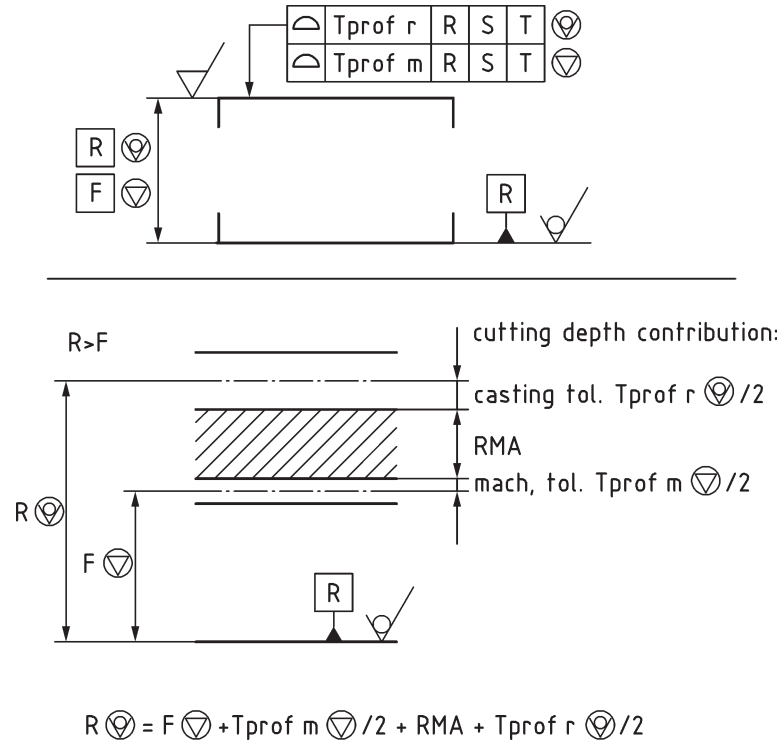


Figure E.1 — Calculation of nominal dimension of moulded condition, plane

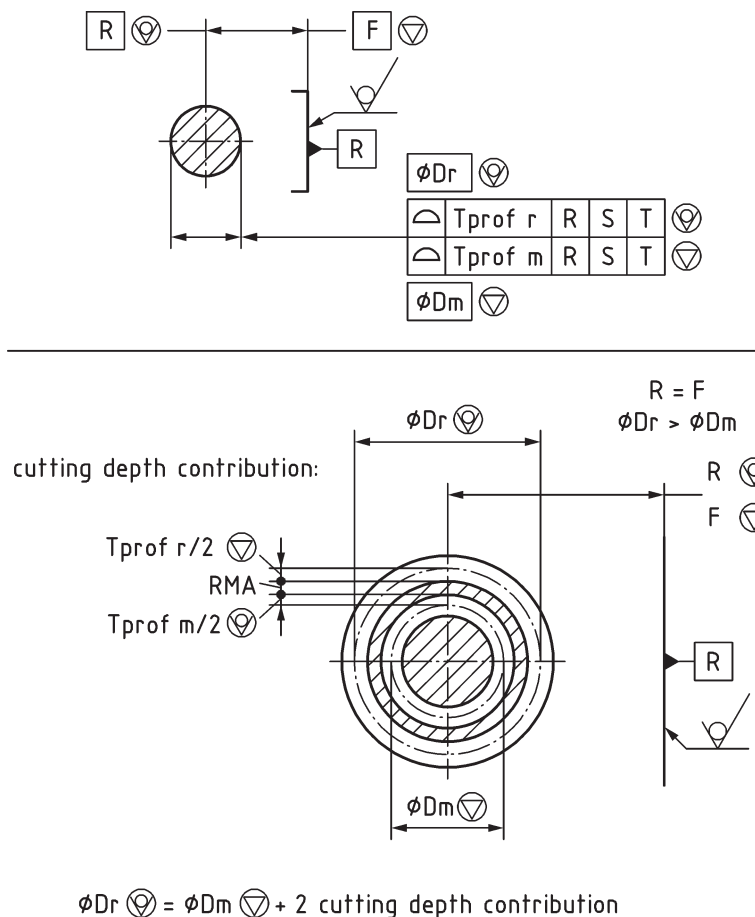


Figure E.2 — Calculation of nominal dimension of moulded condition, shaft, profile tolerance for machined condition

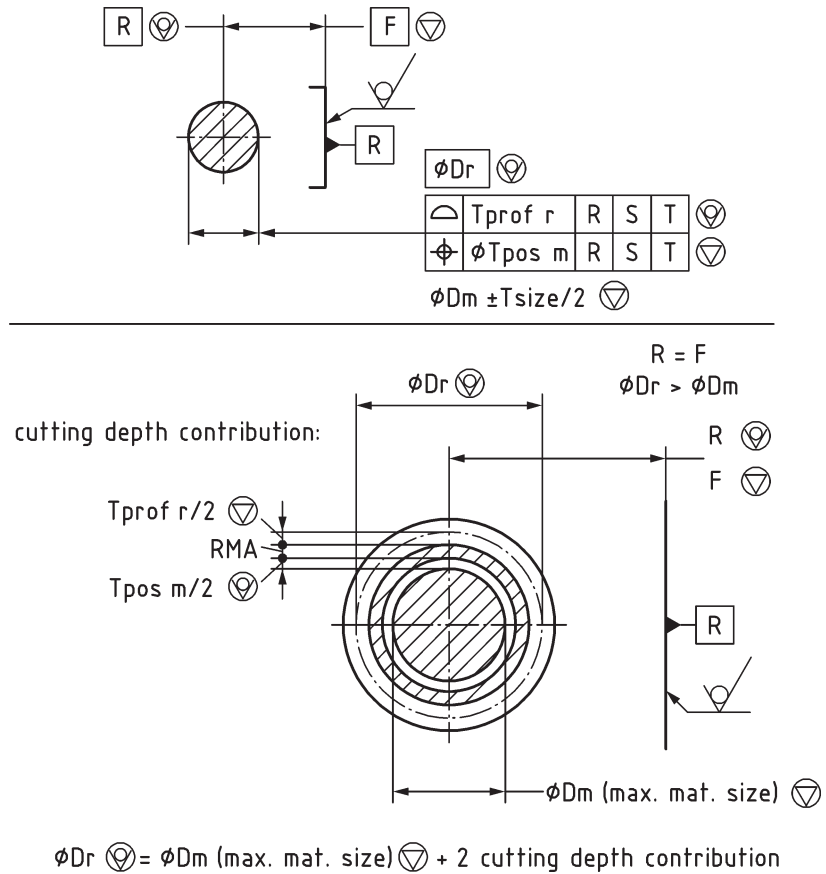


Figure E.3 — Calculation of nominal dimension of moulded condition, shaft, size and positional tolerance for machined condition

Annex F (informative)

Relation to the GPS matrix model

F.1 General

The ISO GPS matrix model given in ISO 14638 gives an overview of the ISO GPS system of which this standard is a part.

F.2 Information about the standard and its use

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

F.3 Position in the GPS matrix model

This part of ISO 8062 is a geometrical product specification (GPS) standard and shall be regarded as a complementary process specific tolerance GPS standard (see ISO 14638). It influences link B of the chain of standards on castings, as illustrated in [Table F.1](#) which is indicated with a filled dot (•).

Table F.1 — Position in the complementary ISO GPS matrix model

	Chain links						
	A	B	C	D	E	F	G
	Symbols and indications	Feature requirements	Feature properties	Conformance and non-conformance	Measurement	Measurement equipment	Calibrations
Process specific standards							
• Machining							
• Casting		•					
• Welding							
• Thermal cutting							
• Plastic moulding							
• Metallic and inorganic coating							
• Painting							
Machine element standards							
• Screw threads							
• Gears							
• Splines							
• Rolling bearings							

Bibliography

- [1] ISO 8015:2011, *Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules*
- [2] ISO 14638:2015, *Geometrical product specifications (GPS) — Matrix model*

