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Second edition
2023-10

ISO general purpose screw threads — Basic and design profiles —

Part 1: Metric screw threads

Filetages ISO pour usages généraux — Profil de base et profil nominal —

Partie 1: Filetages métriques

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Foreword

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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 document 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 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 1, *Screw threads*.

This second edition cancels and replaces the first edition (ISO 68-1:1998), which has been technically revised. It also incorporates the Amendment ISO 68-1:1998/Amd 1:2020.

The main changes are as follows:

— “design profiles” has been added in the document title and the first paragraph of the Scope, and Clause 6 has been added;

— a second paragraph has been added in the Scope;

— subclause 3.1 has been deleted;

— Clause 4 has been added.

A list of all parts in the ISO 68 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.

ISO general purpose screw threads — Basic and design profiles —

Part 1: Metric screw threads

1 Scope

This document specifies the basic and design profiles for ISO general purpose metric screw threads (M).

This document is applicable to the metric fastening screw threads.

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 5408, *Screw threads — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5408 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/

4 Symbols

For the purposes of this document, the following symbols apply.

D major diameter of internal thread (nominal diameter)

d major diameter of external thread (nominal diameter)

D_2 pitch diameter of internal thread

d_2 pitch diameter of external thread

D_1 minor diameter of internal thread

d_1 minor diameter of external thread on basic profile

d_3 minor diameter of external thread on design profile

P pitch

H fundamental triangle height

H_1 thread height of internal thread, and
thread height of external thread on basic profile

h_3 thread height of external thread on design profile

R full root radius of external thread on design profile

R_1 radius on root corners of external thread on design profile

5 Basic profile

The basic profile is shown as a thick line in Figure 1. It is common to internal and external threads.

The dimensions of the basic profile are given in Table 1. They have been calculated by the following formulae, and rounded to the nearest sixth decimal place.

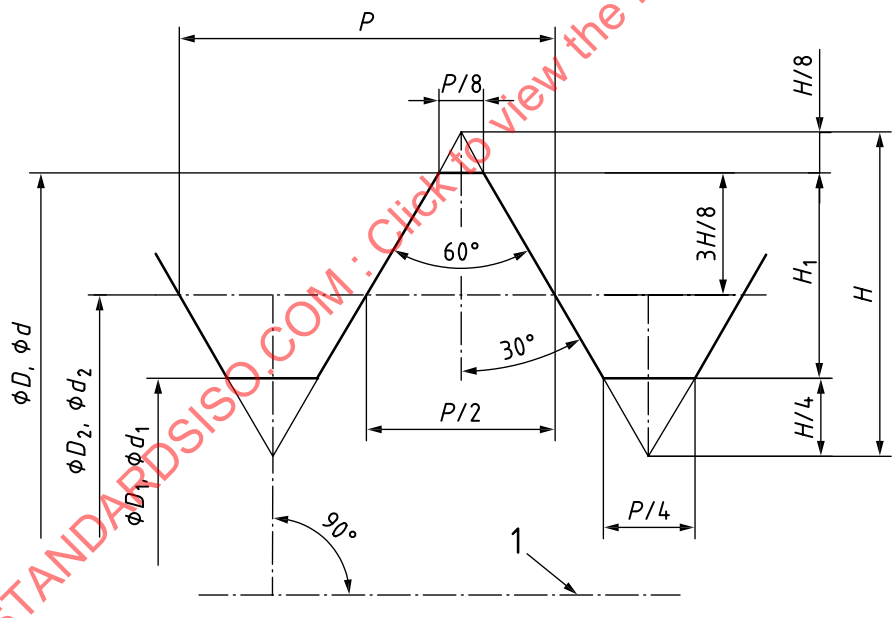
$H = 3^{0,5}\ P / 2 = 0{,}866\ 025\ 404\ P$

$H_1 = 5H/8 = 0{,}541\ 265\ 877\ P$

$3H/8 = 0{,}324\ 759\ 526\ P$

$H/4 = 0{,}216\ 506\ 351\ P$

$H/8 = 0{,}108\ 253\ 175\ P$



Key

1 axis of screw thread

Figure 1 — Basic profile

Table 1 — Dimensions of basic profile

Dimensions in millimetres

Pitch P	H	H_1 $(5H/8)$	$3H/8$	$H/4$	$H/8$
0,2	0,173 205	0,108 253	0,064 952	0,043 301	0,021 651
0,25	0,216 506	0,135 316	0,081 190	0,054 127	0,027 063
0,3	0,259 808	0,162 380	0,097 428	0,064 952	0,032 476
0,35	0,303 109	0,189 443	0,113 666	0,075 777	0,037 889
0,4	0,346 410	0,216 506	0,129 904	0,086 603	0,043 301
0,45	0,389 711	0,243 570	0,146 142	0,097 428	0,048 714
0,5	0,433 013	0,270 633	0,162 380	0,108 253	0,054 127
0,6	0,519 615	0,324 760	0,194 856	0,129 904	0,064 952
0,7	0,606 218	0,378 886	0,227 332	0,151 554	0,075 777
0,75	0,649 519	0,405 949	0,243 570	0,162 380	0,081 190
0,8	0,692 820	0,433 013	0,259 808	0,173 205	0,086 603
1	0,866 025	0,541 266	0,324 760	0,216 506	0,108 253
1,25	1,082 532	0,676 582	0,405 949	0,270 633	0,135 316
1,5	1,299 038	0,811 899	0,487 139	0,324 760	0,162 380
1,75	1,515 544	0,947 215	0,568 329	0,378 886	0,189 443
2	1,732 051	1,082 532	0,649 519	0,433 013	0,216 506
2,5	2,165 064	1,353 165	0,811 899	0,541 266	0,270 633
3	2,598 076	1,623 798	0,974 279	0,649 519	0,324 760
3,5	3,031 089	1,894 431	1,136 658	0,757 772	0,378 886
4	3,464 102	2,165 064	1,299 038	0,866 025	0,433 013
4,5	3,897 114	2,435 696	1,461 418	0,974 279	0,487 139
5	4,330 127	2,706 329	1,623 798	1,082 532	0,541 266
5,5	4,763 140	2,976 962	1,786 177	1,190 785	0,595 392
6	5,196 152	3,247 595	1,948 557	1,299 038	0,649 519
8	6,928 203	4,330 127	2,598 076	1,732 051	0,866 025

6 Design profile

The design profiles for internal and external threads are different. They are shown as the thick lines in Figures 2 and 3, respectively.

The dimensions of the design profiles are given in Table 2. They have been calculated by the following formulae. The values of h_3 are rounded to the nearest sixth decimal place; the values of R are rounded to the nearest third decimal place. The values of $R_{1\ min}$ are decided per the below paragraph for the partially rounded root type.

$h_3 = 17H/24 = 0{,}613\ 434\ 661\ P$

$R = H/6 = 0{,}144\ 34\ P$

$R_1 < 0{,}144\ 34\ P$

The root contour of internal threads is flat. It may be fully or partially rounded, and cleared beyond the $P/8$ flat width. No root radius is specified. The internal thread height, H_1, is listed in Table 1.

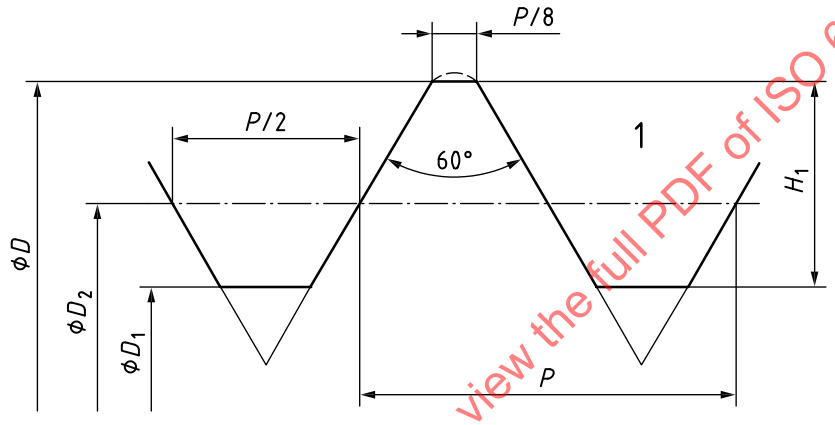
The root contour of external threads is fully or partially rounded with a continuous smoothly blended non-reversing curve, and cleared beyond the $P/4$ flat width. The root bottom is located in the position of $H/6$ truncation. The root form is one of the following types:

— A fully rounded root with a large circular arc, radius R, tangential to the straight flanks. See Figure 3 a).

— A partially rounded root with two small circular arcs, radii R_1, tangential to the straight flanks and the flat on the bottom. See Figure 3 b). The radius R_1 values shall be given in the relevant threaded product document. Unless specifically defined otherwise, the minimum radii R_1 shall be 0,125P.

NOTE The rounded root contour reduces the rate of threading tool crest wear and improves the fatigue strength of external threads.

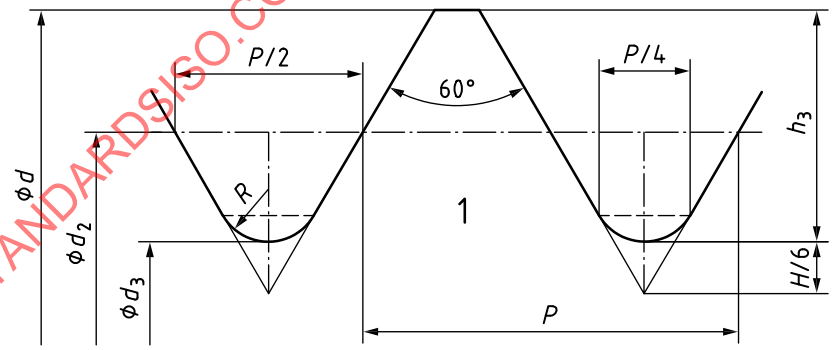
The crest contour of internal and external threads is flat. Depending on the threading methods, it may be rounded.



Key

1 internal thread

Figure 2 — Design profile of internal threads



a) Fully rounded root

Figure 3 — Design profiles of external threads (1 of 2)