INTERNATIONAL STANDARD

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Second edition
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ISO general purpose screw threads — Basic and design profiles —

Part 2: Inch screw threads

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

Partie 2: Filetages en inches

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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 68-2:1998), which has been technically revised. It also incorporates the Amendment ISO 68-2:1998/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;

— the second and third paragraphs have been added in the Scope;

— subclause 3.1 has been deleted;

— Clause 4 has been added;

— the number of decimal places has been changed from 9 to 8 for the constants in the basic profile formulae in Clause 5.

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 2: Inch screw threads

1 Scope

This document specifies the basic and design profiles for ISO inch screw threads (UN and UNR).

UN applies to both internal and external threads. UNR only applies to external threads. A flat or rounded root contour, due to the threading process, is specified for UN threads, while only a defined rounded root contour is specified for UNR external threads.

This document is applicable to the inch 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

n threads per inch (t.p.i.)

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

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 values according to ASME B1.30. For the metric dimensions, see Annex A.

$H = 3^{0,5}/(2n) = 0{,}866\,025\,40/n$

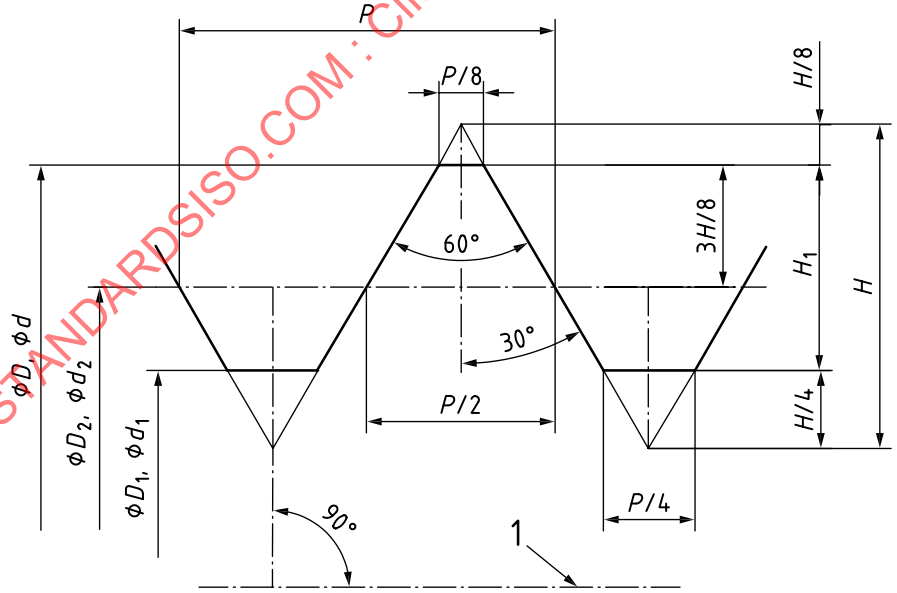
$H_1 = 5H/8 = 0{,}541\,265\,88/n$

$3H/8 = 0{,}324\,759\,53/n$

$H/4 = 0{,}216\,506\,35/n$

$H/8 = 0{,}108\,253\,18/n$

$P = 1/n$



Key

1 axis of screw thread

Figure 1 — Basic profile

Table 1 — Dimensions of basic profile

Dimensions in inches

t.p.i n	P	H	H_1 ($5H/8$)	$3H/8$	$H/4$	$H/8$
80	0,012 500 00	0,010 825	0,006 766	0,004 059	0,002 706	0,001 353
72	0,013 888 89	0,012 028	0,007 518	0,004 511	0,003 007	0,001 504
64	0,015 625 00	0,013 532	0,008 457	0,005 074	0,003 383	0,001 691
56	0,017 857 14	0,015 465	0,009 665	0,005 799	0,003 866	0,001 933
48	0,020 833 33	0,018 042	0,011 276	0,006 766	0,004 511	0,002 255
44	0,022 727 27	0,019 682	0,012 301	0,007 381	0,004 921	0,002 460
40	0,025 000 00	0,021 651	0,013 532	0,008 119	0,005 413	0,002 706
36	0,027 777 78	0,024 056	0,015 035	0,009 021	0,006 014	0,003 007
32	0,031 250 00	0,027 063	0,016 915	0,010 149	0,006 766	0,003 383
28	0,035 714 29	0,030 929	0,019 331	0,011 599	0,007 732	0,003 866
24	0,041 666 67	0,036 084	0,022 553	0,013 532	0,009 021	0,004 511
20	0,050 000 00	0,043 301	0,027 063	0,016 238	0,010 825	0,005 413
18	0,055 555 56	0,048 113	0,030 070	0,018 042	0,012 028	0,006 014
16	0,062 500 00	0,054 127	0,033 829	0,020 297	0,013 532	0,006 766
14	0,071 428 57	0,061 859	0,038 662	0,023 197	0,015 465	0,007 732
13	0,076 923 08	0,066 617	0,041 636	0,024 982	0,016 654	0,008 327
12	0,083 333 33	0,072 169	0,045 105	0,027 063	0,018 042	0,009 021
11	0,090 909 09	0,078 730	0,049 206	0,029 524	0,019 682	0,009 841
10	0,100 000 00	0,086 603	0,054 127	0,032 476	0,021 651	0,010 825
9	0,111 111 11	0,096 225	0,060 141	0,036 084	0,024 056	0,012 028
8	0,125 000 00	0,108 253	0,067 658	0,040 595	0,027 063	0,013 532
7	0,142 857 14	0,123 718	0,077 324	0,046 394	0,030 929	0,015 465
6	0,166 666 67	0,144 338	0,090 211	0,054 127	0,036 084	0,018 042
5	0,200 000 00	0,173 205	0,108 253	0,064 952	0,043 301	0,021 651
4,5	0,222 222 22	0,192 450	0,120 281	0,072 169	0,048 113	0,024 056
4	0,250 000 00	0,216 506	0,135 316	0,081 190	0,054 127	0,027 063

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, and rounded to the nearest values according to ASME B1.30. For the metric dimensions, see Annex A.

$h_3 = 17H/24 = 0{,}613\ 434\ 66/n$

$R = H/6 = 0{,}144\ 337\ 57/n$

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 may be flat, fully rounded 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.

— For UN threads, unless otherwise specified in threaded product document, a flat root contour is specified. However, due to the threading process, it is permissible and more desirable to provide a fully rounded contour of a non-specified size as shown in Figure 3 a), or a partially rounded contour of a non-specified size as shown in Figure 3 b).

— For UNR threads, the root contour with the radius of not less than 0,108 253 18P (= $H/8$) may be one of the following types:

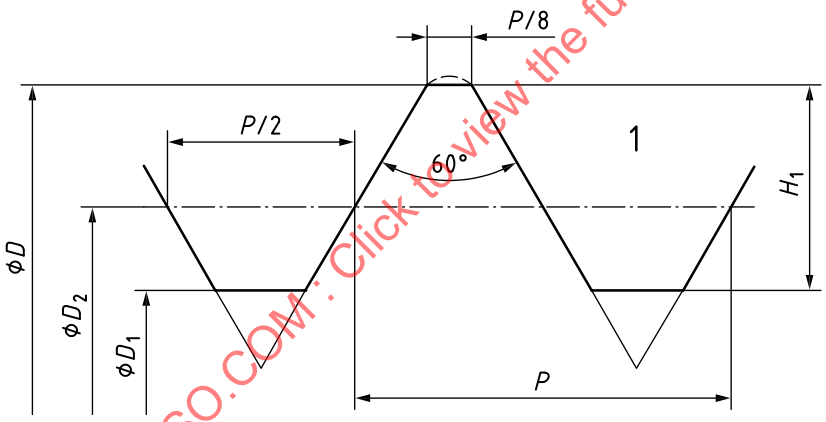
1) a fully rounded root with the radius of not more than 0,144 337 57P as shown in Figure 3 a).

2) a partially rounded root consisting of a combination of flats and radii not less than 0,108 253 18P as shown in Figure 3 b).

Any additional requirements or modifications to the root contour of external threads shall be given in the relevant threaded product document.

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

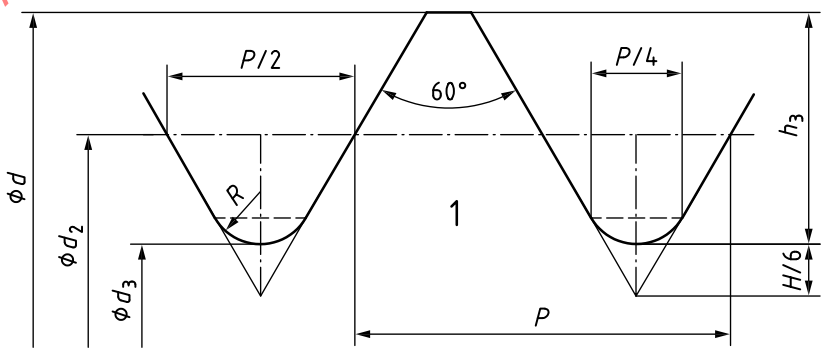
The crest contour of internal and external threads is flat. Depending on the threading methods, it may be rounded.



Key

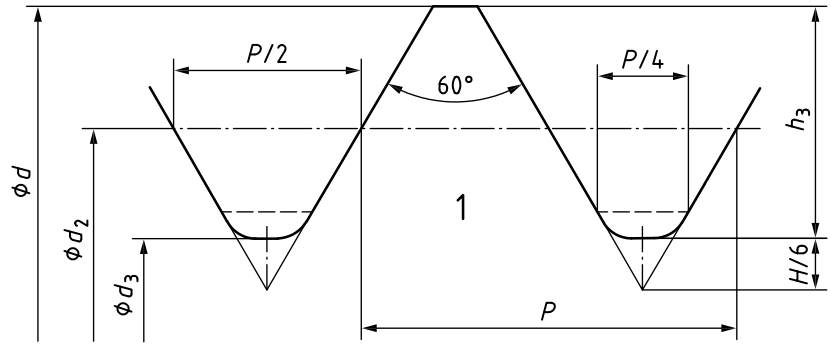
1 internal thread

Figure 2 — Design profile of internal threads



a) Fully rounded root

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



b) Partially rounded root

Key

1 external thread

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

Table 2 — Dimensions of design profiles

Dimensions in inches

t.p.i n	P	h_3 (17H/24)	R 0,144 337 57/n
80	0,012 500 00	0,007 668	0,001 8
72	0,013 888 89	0,008 520	0,002 0
64	0,015 625 00	0,009 585	0,002 3
56	0,017 857 14	0,010 954	0,002 6
48	0,020 833 33	0,012 780	0,003 0
44	0,022 727 27	0,013 942	0,003 3
40	0,025 000 00	0,015 336	0,003 6
36	0,027 777 78	0,017 040	0,004 0
32	0,031 250 00	0,019 170	0,004 5
28	0,035 714 29	0,021 908	0,005 2
24	0,041 666 67	0,025 560	0,006 0
20	0,050 000 00	0,030 672	0,007 2
18	0,055 555 56	0,034 080	0,008 0
16	0,062 500 00	0,038 340	0,009 0
14	0,071 428 57	0,043 817	0,010 3
13	0,076 923 08	0,047 187	0,011 1
12	0,083 333 33	0,051 120	0,012 0
11	0,090 909 09	0,055 767	0,013 1
10	0,100 000 00	0,061 343	0,014 4
9	0,111 111 11	0,068 159	0,016 0
8	0,125 000 00	0,076 679	0,018 0
7	0,142 857 14	0,087 634	0,020 6
6	0,166 666 67	0,102 239	0,024 1
5	0,200 000 00	0,122 687	0,028 9
4,5	0,222 222 22	0,136 319	0,032 1
4	0,250 000 00	0,153 359	0,036 1

Annex A
(informative)

Metric dimensions of profiles

A.1 Basic profile

The metric dimensions of the basic profile are given in Table A.1.

Table A.1 — Metric dimensions of basic profile

Dimensions in millimetres

t.p.i n	P	H	H_1 $(5H/8)$	$3H/8$	$H/4$	$H/8$
80	0,317 500	0,274 963	0,171 852	0,103 111	0,068 741	0,034 370
72	0,352 778	0,305 515	0,190 947	0,114 568	0,076 379	0,038 189
64	0,396 875	0,343 704	0,214 815	0,128 889	0,085 926	0,042 963
56	0,453 571	0,392 804	0,245 503	0,147 302	0,098 201	0,049 101
48	0,529 167	0,458 272	0,286 420	0,171 852	0,114 568	0,057 284
44	0,577 273	0,499 933	0,312 458	0,187 475	0,124 983	0,062 492
40	0,635 000	0,549 926	0,343 704	0,206 222	0,137 482	0,068 741
36	0,705 556	0,611 029	0,381 893	0,229 136	0,152 757	0,076 379
32	0,793 750	0,687 408	0,429 630	0,257 778	0,171 852	0,085 926
28	0,907 143	0,785 609	0,491 005	0,294 603	0,196 402	0,098 201
24	1,058 333	0,916 544	0,572 840	0,343 704	0,229 136	0,114 568
20	1,270 000	1,099 852	0,687 408	0,412 445	0,274 963	0,137 482
18	1,411 111	1,222 058	0,763 786	0,458 272	0,305 515	0,152 757
16	1,587 500	1,374 815	0,859 260	0,515 556	0,343 704	0,171 852
14	1,814 286	1,571 218	0,982 011	0,589 207	0,392 804	0,196 402
13	1,953 846	1,692 080	1,057 550	0,634 530	0,423 020	0,211 510
12	2,116 667	1,833 087	1,145 679	0,687 408	0,458 272	0,229 136
11	2,309 091	1,999 731	1,249 832	0,749 899	0,499 933	0,249 966
10	2,540 000	2,199 705	1,374 815	0,824 889	0,549 926	0,274 963
9	2,822 222	2,444 116	1,527 573	0,916 544	0,611 029	0,305 515
8	3,175 000	2,749 631	1,718 519	1,031 111	0,687 408	0,343 704
7	3,628 571	3,142 435	1,964 022	1,178 413	0,785 609	0,392 804
6	4,233 333	3,666 174	2,291 359	1,374 815	0,916 544	0,458 272
5	5,080 000	4,399 409	2,749 631	1,649 778	1,099 852	0,549 926
4,5	5,644 444	4,888 232	3,055 145	1,833 087	1,222 058	0,611 029
4	6,350 000	5,499 261	3,437 038	2,062 223	1,374 815	0,687 408

A.2 Design profile

The metric dimensions of the design profiles are given in Table A.2.

Table A.2 — Metric dimensions of design profiles

Dimensions in millimetres

t.p.i n	P	h_3 $(17H/24)$	R $0{,}144\ 337\ 57P$
80	0,317 500	0,194 766	0,046
72	0,352 778	0,216 406	0,051
64	0,396 875	0,243 457	0,057
56	0,453 571	0,278 236	0,065
48	0,529 167	0,324 609	0,076
44	0,577 273	0,354 119	0,083
40	0,635 000	0,389 531	0,092
36	0,705 556	0,432 812	0,102
32	0,793 750	0,486 914	0,115
28	0,907 143	0,556 473	0,131
24	1,058 333	0,649 218	0,153
20	1,270 000	0,779 062	0,183
18	1,411 111	0,865 624	0,204
16	1,587 500	0,973 828	0,229
14	1,814 286	1,112 946	0,262
13	1,953 846	1,198 557	0,282
12	2,116 667	1,298 437	0,306
11	2,309 091	1,416 476	0,333
10	2,540 000	1,558 124	0,367
9	2,822 222	1,731 249	0,407
8	3,175 000	1,947 655	0,458
7	3,628 571	2,225 891	0,524
6	4,233 333	2,596 873	0,611
5	5,080 000	3,116 248	0,733
4,5	5,644 444	3,462 498	0,815
4	6,350 000	3,895 310	0,917