UDC 621.882.082.5 DEUTSCHE NORM April 1985

Metric buttress threads

Thread profiles

DIN 513 Part 1

Metrisches Sägengewinde; Gewindeprofile

Supersedes January 1975 edition.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Dimensions in mm

1 Basic profile

The basic profile is the theoretical profile associated with the basic sizes of the major, pitch and minor diameters.

The minor diameter clearance and the clearance between the non-stressed thread flank (see clause 2) and the fundamental deviations of the pitch diameter of the stressed thread flank (see clause 3) are related to these basic sizes.

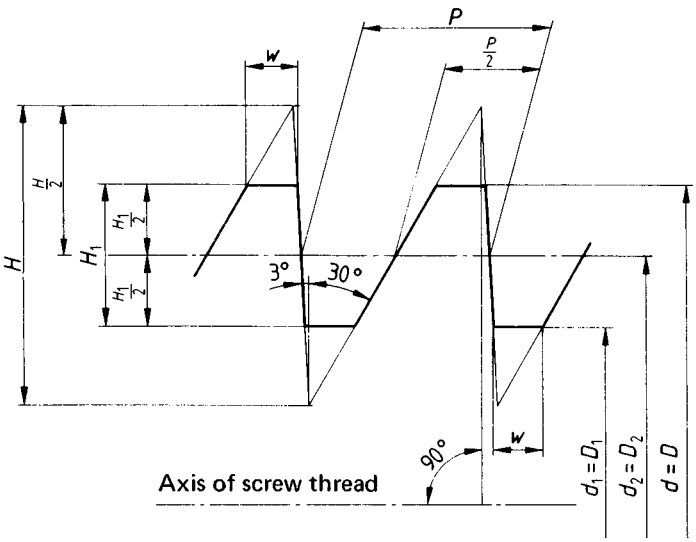


Figure 1. Basic profile

$D = d$ = major diameter of screw thread
$D_2 = d_2$ = pitch diameter of screw thread
$D_1 = d_1$ = minor diameter of screw thread
P = Lead of single-start screw thread and pitch of multiple-start screw thread
H = height of fundamental triangle
H_1 = height of basic profile
w = profile width

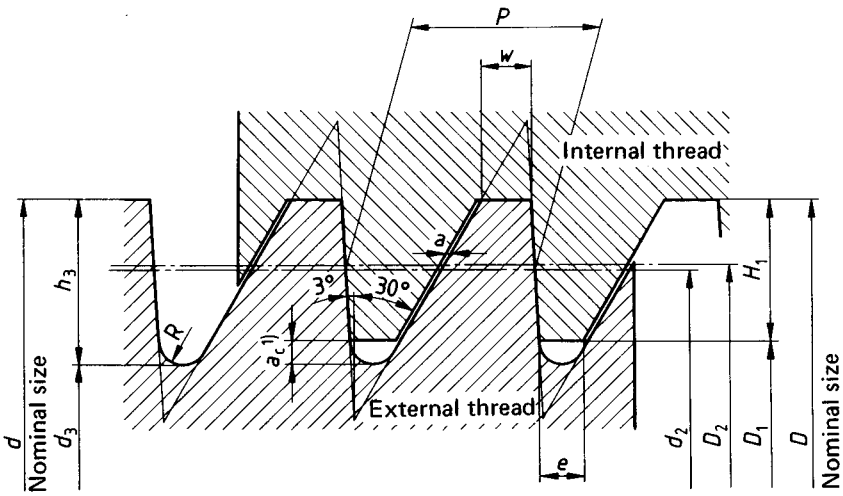
Continued on pages 2 to 4

Table 1. **Dimensions of basic profile**

Pitch P	H 1,5878 P	$H/2$ 0,7939 P	H_1 0,75 P	w 0,26384 P
2	3,1756	1,5878	1,50	0,52768
3	4,7634	2,3817	2,25	0,79152
4	6,3512	3,1756	3,00	1,05536
5	7,9390	3,9695	3,75	1,31920
6	9,5268	4,7634	4,50	1,58304
7	11,1146	5,5573	5,25	1,84688
8	12,7024	6,3512	6,00	2,11072
9	14,2902	7,1451	6,75	2,37456
10	15,8780	7,9390	7,50	2,63840
12	19,0536	9,5268	9,00	3,16608
14	22,2292	11,1146	10,50	3,69376
16	25,4048	12,7024	12,00	4,22144
18	28,5804	14,2902	13,50	4,74912
20	31,7560	15,8780	15,00	5,27680
22	34,9316	17,4658	16,50	5,80448
24	38,1072	19,0536	18,00	6,33216
28	44,4584	22,2292	21,00	7,38752
32	50,8096	25,4048	24,00	8,44288
36	57,1608	28,5804	27,00	9,49824
40	63,5120	31,7560	30,00	10,55360
44	69,8632	34,9316	33,00	11,60896

2 Nominal profiles

The nominal profiles to which the deviations and tolerances are related have specified clearances on the minor diameter and between the non-loadbearing thread flanks, relative to the basic profile (see figure 1).



$H_1 = 0{,}75\,P$
$h_3 = H_1 + a_c = 0{,}86777\,P$
$a = 0{,}1 \cdot \sqrt{P}$ (axial clearance)
$a_c = 0{,}11777\,P$
$w = 0{,}26384\,P$
$e = 0{,}26384\,P - 0{,}1\sqrt{P} = w - a$
$R = 0{,}12427\,P$
$D_1 = d - 2H_1 = d - 1{,}5 \cdot P$
$d_3 = d - 2h_3$
$d_2 = d - 0{,}75\,P$
$D_2 = d - 0{,}75\,P + 3{,}1758 \cdot a$

Figure 2. Profiles for external and internal threads with clearances on the non-loadbearing flank on the minor diameter but with no clearance between the loadbearing flanks or on the major diameter (nominal sizes)

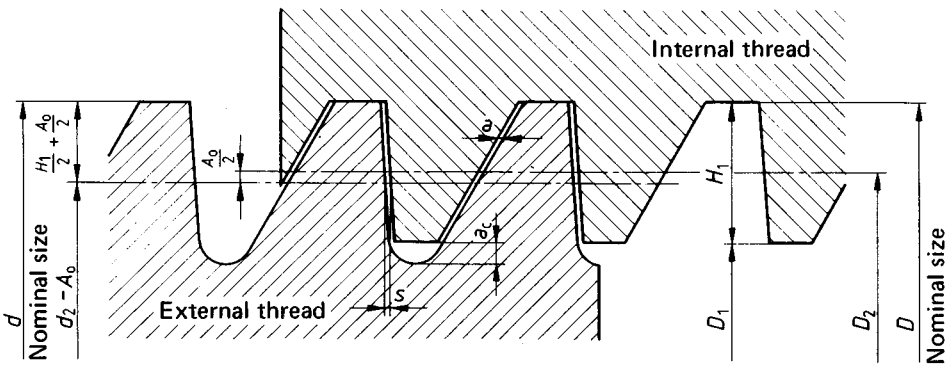
1) The index c stands for crest.

Table 2. **Nominal profile dimensions**

P	a_c	a	e	h_3	R
2	0,236	0,1414	0,386	1,736	0,249
3	0,353	0,1732	0,618	2,603	0,373
4	0,471	0,2	0,855	3,471	0,497
5	0,589	0,2236	1,096	4,339	0,621
6	0,707	0,2449	1,338	5,207	0,746
7	0,824	0,2646	1,582	6,074	0,870
8	0,942	0,2828	1,828	6,942	0,994
9	1,060	0,3	2,075	7,810	1,118
10	1,178	0,3162	2,322	8,678	1,243
12	1,413	0,3464	2,820	10,413	1,491
14	1,649	0,3742	3,320	12,149	1,740
16	1,884	0,4	3,821	13,884	1,988
18	2,120	0,4243	4,325	15,620	2,237
20	2,355	0,4472	4,830	17,355	2,485
22	2,591	0,4690	5,335	19,091	2,734
24	2,826	0,4899	5,842	20,826	2,982
28	3,298	0,5292	6,858	24,298	3,480
32	3,769	0,5657	7,877	27,769	3,977
36	4,240	0,6	8,898	31,240	4,474
40	4,711	0,6325	9,921	34,711	4,971
44	5,182	0,6633	10,946	38,182	5,468

3 Profiles of threads with clearance on the flank

The profiles with clearance on the flank result from the nominal profiles and the fundamental deviation for the pitch diameter of the loadbearing flank.



s = 0,3149 A_0

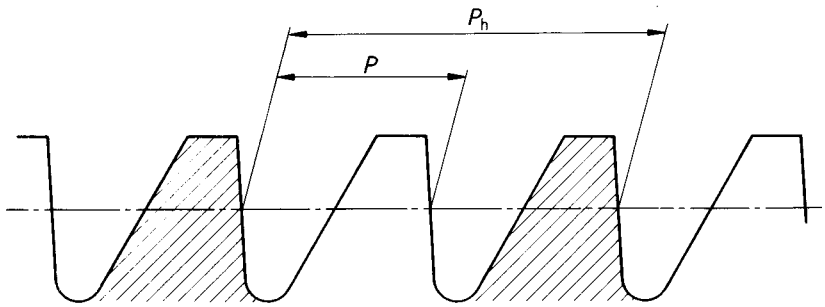
A_0 = fundamental deviation (= upper deviation) for external thread on pitch diameter

For the other dimension letters, see figure 2.

Figure 3. Profiles for external and internal threads with clearances on the minor diameter and on the flank (standard nut system) but with no clearance on the major diameter

4 Profiles for multiple-start threads

(The profile shown is of a double-start thread)



P_h = lead (axial advance at one turn)
P = pitch (axial distance between two neighbouring flanks being in the same direction)

Figure 4. Profiles for multiple-start threads

Multiple-start (n-start) threads have the same profile as single-start threads with lead P_h = pitch P. For the pitch P of multiple-start threads, only the values permitted for the lead P (which is equal to pitch P) of single-start threads may be selected. However, the multiple of the pitch P of multiple-start threads need not correspond to the value permitted for single-start threads.

Other relevant standards

DIN 13 Part 14	ISO metric screw threads; principles of a tolerance system for screw threads from 1 mm diameter upwards
DIN 513 Part 2	Metric buttress threads; general plan
DIN 513 Part 3	Metric buttress threads; deviations and tolerances
DIN 2244	Screw threads; concepts

Previous editions

DIN 513: 10.25, 01.27x
DIN 514 Part 1: 10.25, 01.27xx
DIN 514 Part 2: 10.25, 01.27x
DIN 515: 10.25, 01.27xx
DIN 513 Part 1: 01.75

Amendments

The following amendments have been made in comparison with the January 1975 edition:

a) The status of the standard is no longer that of a preliminary standard.

b) In figure 2, D_2 has been associated with an additional pitch diameter line and an extended formula for D_2 has been included (see Explanatory notes).

c) The standard has been editorially revised.

Explanatory notes

DIN 513 Part 1 to Part 3 were submitted to ISO/TC 1/SC 3 as a German proposal for a corresponding ISO Standard. As it was not possible to agree to DIN Standards being adopted without amendment as ISO Standards, DIN 513 Part 1 to Part 3 were published as preliminary standards. Meanwhile, the interest of the ISO/TC 1 member bodies in an ISO Standard on buttress threads waned, mainly because there seemed to be no prospects of harmonizing the national standards of the individual countries on buttress threads. Finally, ISO/TC 1 decided to stop work on this item.

DIN 513 Part 1 to Part 3 have proved successful in Germany; only minor amendments have been necessary. Just the dimensioning and the formula for the pitch diameter of the internal thread, D_2, in figure 2 of DIN 513 Part 1 did not correspond to the pitch diameter definition in DIN 2244. The pitch diameter of the basic profile corresponding to the pitch diameter of the external thread had also been adopted as the reference diameter for the internal thread although, because of the axial clearance a, the pitch diameter of the internal thread is greater by

$$2 \cdot \cos 3^{\circ} \frac{\sin 30^{\circ}}{\sin 147^{\circ}} \cdot \tan 60^{\circ} \cdot a = 3{,}17582 \cdot a$$

than that of the external thread. This error lead to unnecessary conversions having to be made, e.g. when measuring thread adjustment gauges or plain plug gauges using the three-wire method.

International Patent Classification

F 16 B 33/02