

Specification for

ISO metric trapezoidal screw threads

UDC 621.882.082.1:621.882.082.4

Confirmed January 2010

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The organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard.

British Valve Manufacturers' Association	Screw thread Tool Manufacturers' Association
Gauge and Tool Makers' Association	Society of British Aerospace Companies Ltd

This British Standard, having been prepared under the direction of the Mechanical Engineering Industry Standards Committee was published under the authority of the Executive Board on 28 May 1976

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The following BSI references relate to the work on this standard:
Committee reference MEE/1 and MEE/1/9
Draft for comment 72/37746 DC

ISBN 0 580 09462 6

Amendments issued since publication

Amd. No.	Date of issue	Comments
3552	December 1981	
5095	June 1986	
5507	June 1987	Indicated by a sideline in the margin

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Foreword

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee, and specifies ISO metric trapezoidal screw threads from 8 mm to 300 mm in diameter. The standard is based on International Standards ISO 2901, ISO 2902, ISO 2903 and ISO 2904 [published in October 1977 by the International Organization for Standardization (ISO)], which specify the basic profile, the general plan, tolerances, and nominal sizes respectively for ISO metric trapezoidal screw threads.

The tolerance system in this standard is based on that for ISO general purpose metric screw threads and reflects ISO R965-1, complete with tolerance positions c and e for pitches above 6 mm, but with different values. Formulae for the calculation of fundamental deviations and tolerances are given in Appendix A to this standard.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 24, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies the requirements for ISO metric trapezoidal screw threads from 8 mm to 300 mm in diameter. Single-start and multiple-start threads are included in the details for designation and tolerances.

A tolerance system is specified but it does not apply to threads with special requirements for axial displacement, e.g. lead screws.

2 Reference

The title of the British Standard referred to in this standard is shown on the inside back cover.

3 Definitions

For the purposes of this British Standard the following thread form definitions apply.

3.1

basic profile

the basic profile is the theoretical profile associated with the basic sizes of the major, pitch and minor diameters of the thread. The deviations are applied to these basic sizes (See Table 1 and Figure 1.)

3.2

basic size

the theoretical size to which the deviations are applied in order to obtain the limits of size

3.3

nominal size

the size which is used for general identification. It is generally the basic major diameter of the thread

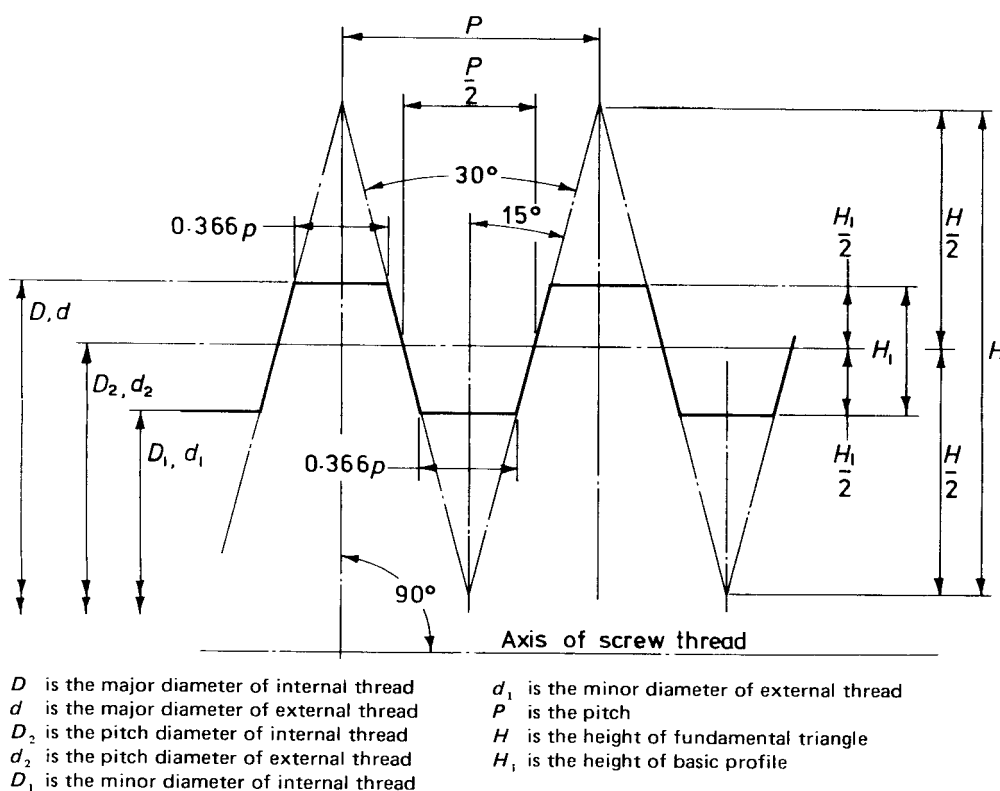
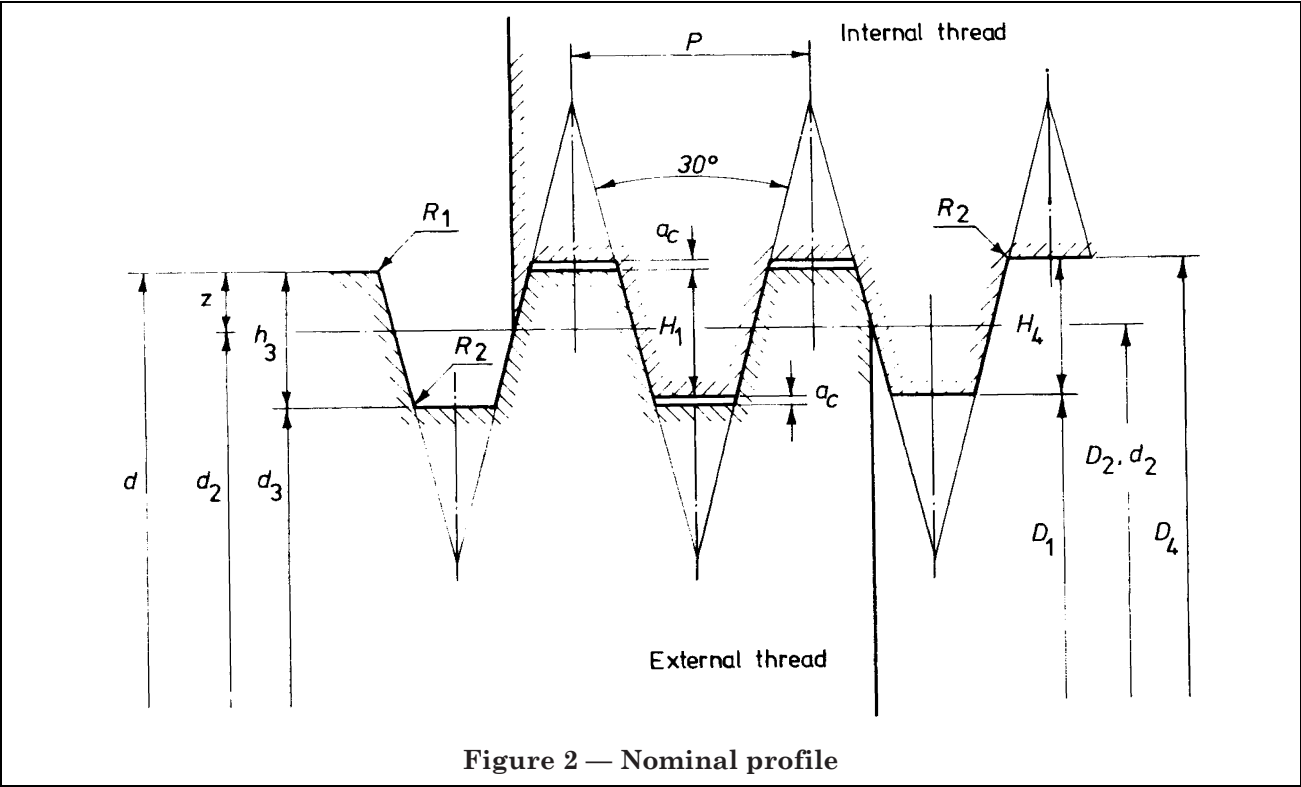


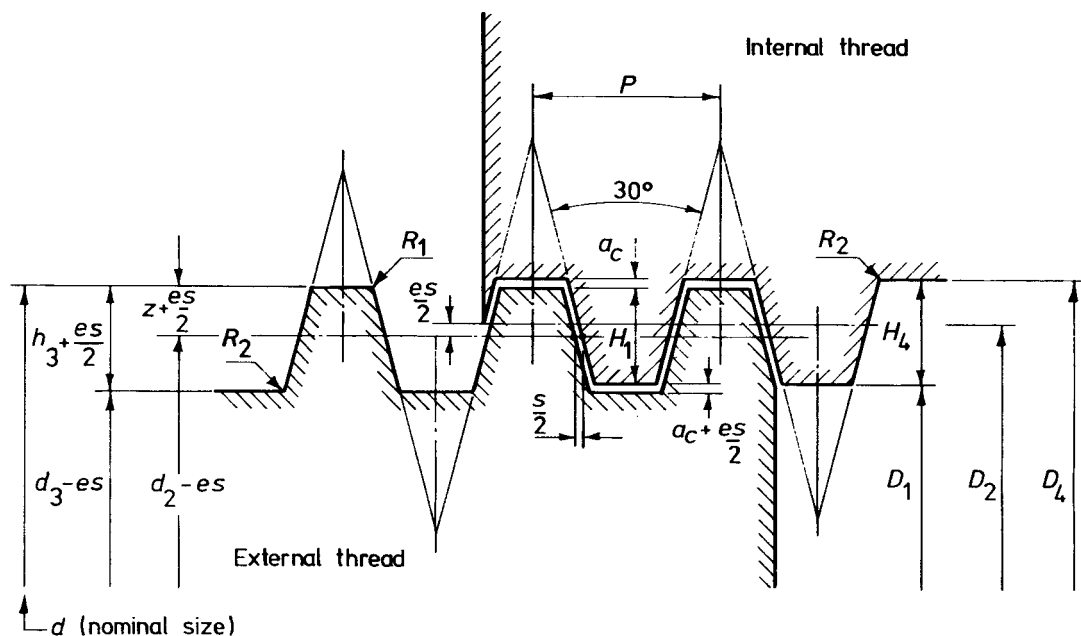
Figure 1 — Basic profile

Table 1 — Dimensions for basic profile

Dimensions are in millimetres.

Pitch				
<i>P</i>	$\frac{H}{1.866 P}$	$\frac{H/2}{0.933 P}$	$\frac{H_1}{0.5 P}$	$0.366 P$
1.5	2.799	1.400	0.75	0.549
2	3.732	1.866	1	0.732
3	5.598	2.799	1.5	1.098
4	7.464	3.732	2	1.464
5	9.330	4.665	2.5	1.830
6	11.196	5.598	3	2.196
7	13.062	6.531	3.5	2.562
8	14.928	7.464	4	2.928
9	16.794	8.397	4.5	3.294
10	18.660	9.330	5	3.660
12	22.392	11.196	6	4.392
14	26.124	13.062	7	5.124
16	29.856	14.928	8	5.856
18	33.588	16.794	9	6.588
20	37.320	18.660	10	7.320
22	41.052	20.526	11	8.052
24	44.784	22.392	12	8.784
28	52.248	26.124	14	10.248
32	59.712	29.856	16	11.712
36	67.176	33.588	18	13.176
40	74.640	37.320	20	14.640
44	82.104	41.052	22	16.104





$H_1 = 0.5 P$	$D_4 = d + 2a_c$
$h_3 = 0.5 P + a_c = H_1 + a_c = H_4$	$a_c = \text{crest clearance}$
$z = 0.25 P = H_1/2$	$es = \text{fundamental deviation}$
$d_3 = d - 2h_3$	$s = 0.267\ 95\ es$
$d_2 = D_2 = d - 2z = d - 0.5 P$	$R_1 \text{ max.} = 0.5 a_c$
$D_1 = d - 2H_1 = d - P$	$R_2 \text{ max.} = a_c$

NOTE 1 It is recommended to provide for a rounding or a chamfer max. $0.5 a_c$ at the major diameter of the external threads.

NOTE 2 In case of manufacture by rolling, the profile at the minor diameter can be modified in order to obtain a rounding on the root of the thread. The minor diameter d_3 of the external thread must in this case be reduced by $0.15 P$.

Figure 3 — Profile for threads with clearance on the crest and the flank

Table 2 — Dimensions for the thread profile

Dimensions are in millimetres.

P	a_c	h_3	H_1	H_4	R_1 max.	R_2 max.
1.50	0.15	0.9	0.75	0.9	0.08	0.15
2	0.25	1.25	1	1.25	0.13	0.25
3	0.25	1.75	1.5	1.75	0.13	0.25
4	0.25	2.25	2	2.25	0.13	0.25
5	0.25	2.75	2.5	2.75	0.13	0.25
6	0.5	3.5	3	3.5	0.25	0.5
7	0.5	4	3.5	4	0.25	0.5
8	0.5	4.5	4	4.5	0.25	0.5
9	0.5	5	4.5	5	0.25	0.5
10	0.5	5.5	5	5.5	0.25	0.5
12	0.5	6.5	6	6.5	0.25	0.5
14	1	8	7	8	0.5	1
16	1	9	8	9	0.5	1
18	1	10	9	10	0.5	1
20	1	11	10	11	0.5	1
22	1	12	11	12	0.5	1
24	1	13	12	13	0.5	1
28	1	15	14	15	0.5	1
32	1	17	16	17	0.5	1
36	1	19	18	19	0.5	1
40	1	21	20	21	0.5	1
44	1	23	22	23	0.5	1

4 Maximum material profiles

These profiles have prescribed clearances on the major, minor, and pitch diameter referring to the basic profile.

Should modifications to these profiles become necessary due to the particular methods of fabrication, they shall be agreed between the customer and the manufacturer, (See Table 2 and Figure 2 and Figure 3.)

5 Diameter/pitch combinations

Table 3 gives the standard series of nominal diameters and their associated pitches. The nominal diameters are classified as first, second and third choice and are specified in columns 1, 2 and 3 respectively. The diameters in column 3 shall not be used for new designs. The preferred pitches for any diameter are shown within the frames in Table 3.

6 Nominal sizes

Nominal sizes of the screw threads are shown in Table 4.

7 Length of thread engagement

Lengths of thread engagement are given in Table 5 and are classified into groups designated “normal” (N) and “long” (L), depending on the number of threads engaged for a given basic major diameter.

8 Tolerances, grades and positions

8.1 Tolerance symbols are shown in Table 6. Recommended tolerance classes are shown in Table 11. For the minor diameter tolerances of internal threads (T_{D1}) and the major diameter tolerances of external threads (T_d) there is only one tolerance grade, i.e. 4. Values are given in Table 8 and Table 9 respectively. Values for the pitch diameter tolerance of internal threads (T_{D2}) are given in Table 13 and for external threads (T_{d2}) in Table 14.

8.2 The tolerances do not apply to trapezoidal screw threads with special requirements for axial displacement, e.g. lead screws.

8.3 Tolerance grades shall be as shown in Table 7.

8.4 Tolerance positions are invariably H for internal threads with zero fundamental deviation.

8.4.1 Tolerance positions for the pitch diameter of external threads are c and e where the fundamental deviation is negative. The tolerance position for the major diameters of external threads is h with zero fundamental deviation. Fundamental deviations are shown in Table 10. Tolerance positions are shown graphically in Figure 4, Figure 5 and Figure 6.

8.4.2 Limits of tolerance values (pitch diameter tolerance positions c and e for the minor diameter tolerance of external threads (T_{d3}) and the pitch diameter tolerance of external threads (T_{d2}) are given in Table 12 and Table 15 respectively.

8.5 Tolerances for multiple-start threads are the same as those for single-start with the exception of the pitch diameter tolerances which are multiplied by the factors shown in Table 16.