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## ISO metric trapezoidal screw threads — Tolerances

*Filetages métriques trapézoïdaux ISO — Tolérances*

ICS: 21.040.10

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## Foreword

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ISO 2903 was prepared by Technical Committee ISO/TC 1, *Screw Threads*.

This third edition cancels and replaces the second edition (ISO 2903:1993), **Clauses 1, 13 and 14, and Table 7** of which have been technically revised.

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# ISO metric trapezoidal screw threads — Tolerances

## 1 Scope

This International Standard specifies a tolerance system for metric trapezoidal screw threads in accordance with ISO 2902. The tolerances refer to the **design profile** in accordance with ISO 2901.

The tolerance system does not apply to trapezoidal screw threads with special requirements on axial displacement, for example machine tool lead and feed screws and nuts.

## 2 Normative references

The following referenced documents are indispensable for the application 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 965-1, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data*

ISO 2901, *ISO metric trapezoidal screw threads — Basic and design profiles*

ISO 2902, *ISO metric trapezoidal screw threads — General plan*

ISO 5408, *Screw threads — Vocabulary*

## 3 Terms and definitions

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

## 4 Symbols

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

$D_4$	basic major diameter of internal thread
$D$	<b>nominal diameter (internal thread)</b>
$D_2$	basic pitch diameter of internal thread
$D_1$	basic minor diameter of internal thread
$d$	basic major diameter of external thread ( <b>nominal diameter</b> )
$d_2$	basic pitch diameter of external thread
$d_3$	basic minor diameter of external thread
$P$	pitch
$Ph$	lead
N	designation for normal group of thread engagement

L	designation for long group of thread engagement
T	tolerance
$T_{D2}, T_{D1}, T_d, T_{d2}, T_{d3}$	tolerances for $D_2, D_1, d, d_2$ and $d_3$ , respectively (no tolerance for $D_4$ )
$EI, ei$	lower limit deviations
$ES, es$	upper limit deviations

### 5 Tolerance system

The system is based on the tolerance system for ISO general-purpose metric screw threads of ISO 965-1.

### 6 Tolerance positions

The following tolerance positions are standardized for the pitch diameters.

- for internal threads: H with zero fundamental deviation ( $EI$ ). See Figure 1.
- for external threads: c and e with negative fundamental deviation ( $es$ ). See Figure 2.

The tolerance position for the minor diameter  $D_1$  and the major diameter  $D_4$  of the internal threads is always H, i.e. with zero fundamental deviation ( $EI$ ).

The tolerance position for the major diameter  $d$  and minor diameter  $d_3$  of the external threads is in all cases h, i.e. with zero fundamental deviation ( $es$ ), and it is independent of the tolerance positions of the pitch diameter.

The fundamental deviations for the pitch diameters of internal and external threads are given in Table 1.

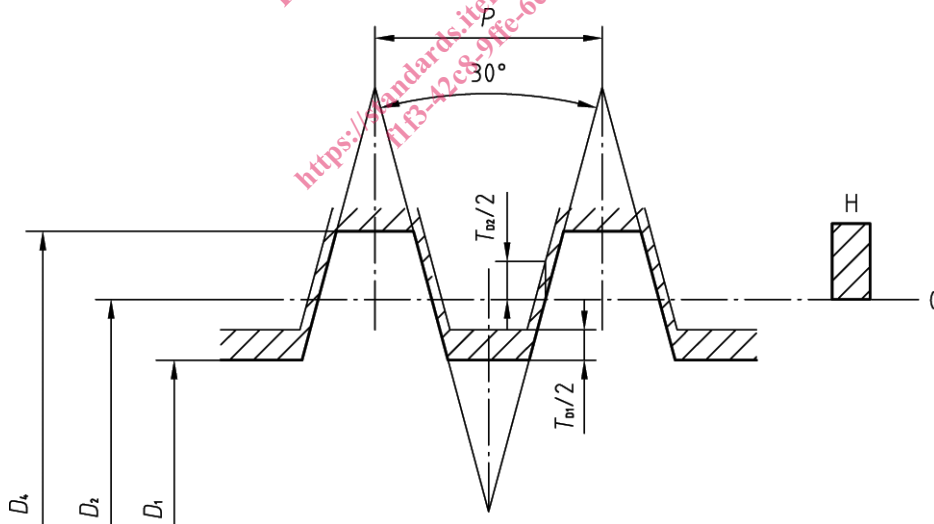


Figure 1 — Internal threads with tolerance position H

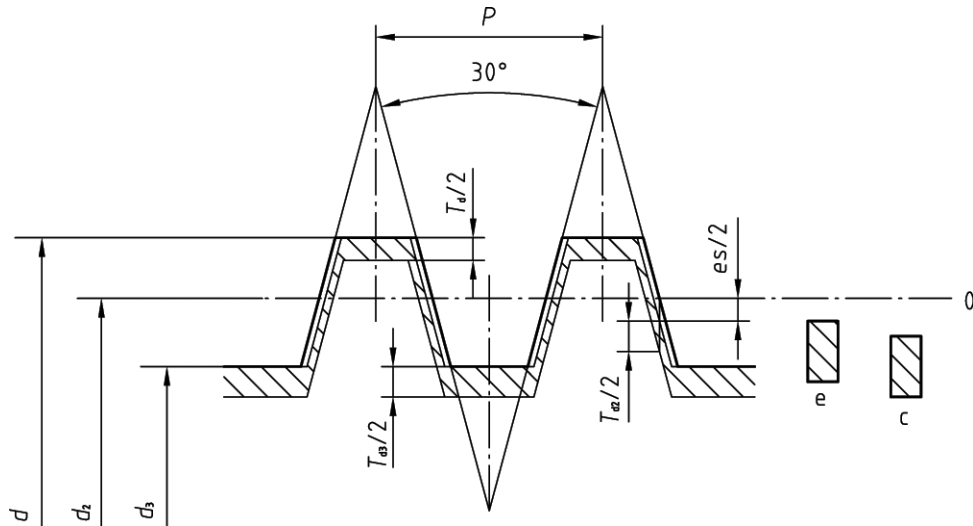


Figure 2 — External threads with tolerance positions c and e for the pitch diameter

Table 1 — Fundamental deviations for the pitch diameters of internal and external threads

Pitch $P$	Fundamental deviations		
	Internal threads	External threads	
	$D_2$	$d_2$	
	H E/	c es	e es
mm	$\mu\text{m}$	$\mu\text{m}$	$\mu\text{m}$
1,5	0	-140	-67
2	0	-150	-71
3	0	-170	-85
4	0	-190	-95
5	0	-212	-106
6	0	-236	-118
7	0	-250	-125
8	0	-265	-132
9	0	-280	-140
10	0	-300	-150
12	0	-335	-160
14	0	-355	-180
16	0	-375	-190
18	0	-400	-200
20	0	-425	-212
22	0	-450	-224
24	0	-475	-236
28	0	-500	-250
32	0	-530	-265
36	0	-560	-280
40	0	-600	-300
44	0	-630	-315

## 7 Tolerance grades

The tolerance grades for the following screw thread diameters are standardized:

	Tolerance grades		
Minor diameter of internal threads $D_1$	4		
Major diameter of external threads $d$	4		
Pitch diameter of internal threads $D_2$	7	8	9
Pitch diameter of external threads $d_2$	7	8	9
Minor diameter of external threads $d_3$	7	8	9

The tolerance grade for the minor diameter ( $d_3$ ) of the external thread is always the same as for the pitch diameter ( $d_2$ ). However, the values for  $T_{d3}$  and  $T_{d2}$  are not the same for a same grade.

The minor diameter tolerances of internal thread,  $T_{D1}$ , are given in Table 2.

The major diameter tolerances of external thread,  $T_d$ , are given in Table 3.

**Table 2 — Minor diameter tolerances of internal threads ( $T_{D1}$ )**

Pitch $P$	Tolerance grade 4
mm	$\mu\text{m}$
1,5	190
2	236
3	315
4	375
5	450
6	500
7	560
8	630
9	670
10	710
12	800
14	900
16	1000
18	1120
20	1180
22	1250
24	1320
28	1500
32	1600
36	1800
40	1900
44	2000

**Table 3 — Major diameter tolerances of external threads ( $T_d$ )**

Pitch $P$	Tolerance grade 4
mm	$\mu\text{m}$
1,5	150
2	180
3	236
4	300
5	335
6	375
7	425
8	450
9	500
10	530
12	600
14	670
16	710
18	800
20	850
22	900
24	950
28	1060
32	1120
36	1250
40	1320
44	1400

The pitch diameter tolerances of internal thread,  $T_{D2}$ , are given in Table 4.

The pitch diameter tolerances of external thread,  $T_{d2}$ , are given in Table 5.

Table 4 — Pitch diameter tolerances of internal thread ( $T_{D2}$ )

Basic major diameter $D$		Pitch $P$	Tolerance grade		
over mm	up to and incl. mm		7 $\mu\text{m}$	8 $\mu\text{m}$	9 $\mu\text{m}$
5,6	11,2	1,5	224	280	355
		2	250	315	400
		3	280	355	450
11,2	22,4	2	265	335	425
		3	300	375	475
		4	355	450	560
		5	375	475	600
		8	475	600	750
22,4	45	3	335	425	530
		5	400	500	630
		6	450	560	710
		7	475	600	750
		8	500	630	800
		10	530	670	850
		12	560	710	900
45	90	3	355	450	560
		4	400	500	630
		8	530	670	850
		9	560	710	900
		10	560	710	900
		12	630	800	1000
		14	670	850	1060
		16	710	900	1120
		18	750	950	1180
		90	180	4	425
6	500			630	800
8	560			710	900
12	670			850	1060
14	710			900	1120
16	750			950	1180
18	800			1000	1250
20	800			1000	1250
22	850			1060	1320
24	900			1120	1400
28	950			1180	1500
180	355	8	600	750	950
		12	710	900	1120
		18	850	1060	1320
		20	900	1120	1400
		22	900	1120	1400
		24	950	1180	1500
		32	1060	1320	1700
		36	1120	1400	1800
		44	1120	1400	1800
		44	1250	1500	1900



**Table 5** — Pitch diameter tolerances of external thread ( $T_{d2}$ )

Basic major diameter $d$		Pitch $P$	Tolerance grade		
over mm	up to and incl. mm		7 $\mu\text{m}$	8 $\mu\text{m}$	9 $\mu\text{m}$
5,6	11,2	1,5	170	212	265
		2	190	236	300
		3	212	265	335
11,2	22,4	2	200	250	315
		3	224	280	355
		4	265	335	425
		5	280	355	450
		8	355	450	560
22,4	45	3	250	315	400
		5	300	375	475
		6	335	425	530
		7	355	450	560
		8	375	475	600
		10	400	500	630
		12	425	530	670
45	90	3	265	335	425
		4	300	375	475
		8	400	500	630
		9	425	530	670
		10	425	530	670
		12	475	600	750
		14	500	630	800
		16	530	670	850
		18	560	710	900
		90	180	4	315
6	375			475	600
8	425			530	670
12	500			630	800
14	530			670	850
16	560			710	900
18	600			750	950
20	600			750	950
22	630			800	1000
24	670			850	1060
180	355	8	450	560	710
		12	530	670	850
		18	630	800	1000
		20	670	850	1060
		22	670	850	1060
		24	710	900	1120
		32	800	1000	1250
		36	850	1060	1320
		40	850	1060	1320
		44	900	1120	1400

The minor diameter tolerances of external thread,  $T_{d3}$ , are given in Table 6.