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Ground thread taps for ISO metric threads of tolerances 4H to 8H and 4G to 6G coarse and fine pitches — Manufacturing tolerances on the threaded portion

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FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2857 was drawn up by Technical Committee ISO/TC 29, *Small tools*, and circulated to the Member Bodies in August 1972.

It has been approved by the Member Bodies of the following countries :

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Japan
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CONTENTS

Ground thread taps for ISO metric threads of tolerances 4H to 8H and 4G to 6G coarse and fine pitches — Manufacturing tolerances on the threaded portion

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the manufacturing tolerances on the threaded portion of taps for producing the ISO metric threads of tolerance classes 4H to 8H and 4G to 6G as defined in ISO/R 965/I to III (excluding, consequently, classes 7G and 8G considered as usually produced with ground thread taps).

It is valid for the short taps specified in ISO/R 529 as well as for any other kind of ground thread taps with the same diameters and pitches.

The internal threads produced with those taps are conventionally designated by the simplified denomination of "nut" in agreement with the word used in ISO/R 965 for the general designation of all internal threads.

Annexes A and B give, for all threads with coarse and fine pitches, the manufacturing tolerances on the threaded portion of taps for the following classes of nuts :

4H and 5H — 6H — 7H and 8H

and 4G and 5G — 6G

2 REFERENCES

ISO/R 529, *Short machine taps and hand taps.*

ISO/R 724, *ISO general purpose metric screw threads — Basic dimensions.*

ISO/R 965/I, *ISO general purpose metric screw threads — Tolerances — Principles and basic data.*

ISO/R 965/II, *ISO general purpose metric screw threads — Tolerances — Limits of sizes for commercial bolt and nut threads — Medium quality.*

ISO/R 965/III, *ISO general purpose metric screw threads — Tolerances — Deviations for constructional threads.*

3 BASIC DATA

3.1 Thread profile of nuts : see figure 1.

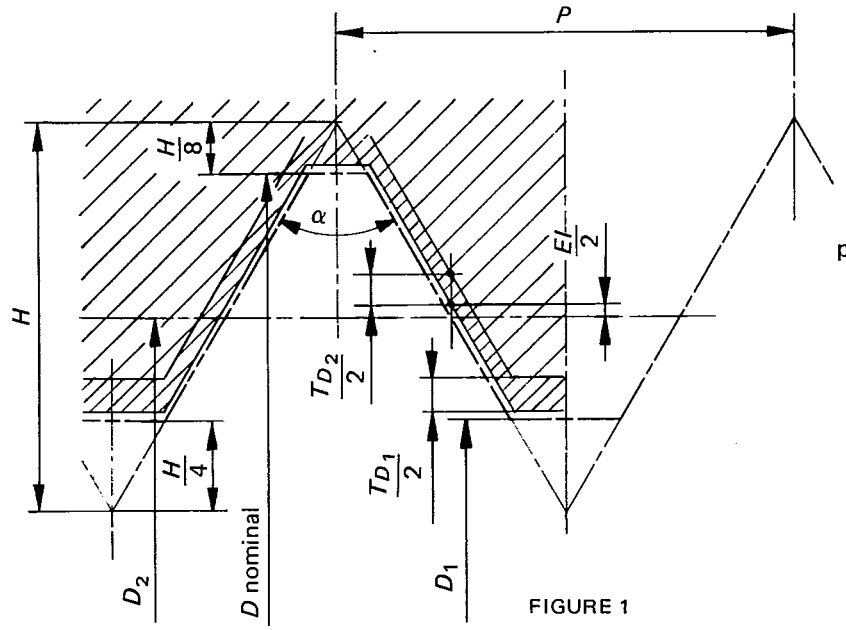


FIGURE 1

Basic profile

D = nominal diameter

D_1 = basic minor diameter

D_2 = pitch diameter

P = pitch of thread

α = included angle of thread

H = height of fundamental triangle

EI = minimum clearance, zero for H deviation positive for G deviation

T_{D_1} = minor diameter tolerance

T_{D_2} = pitch diameter tolerance

3.2 Thread profile of tap : see figure 2.

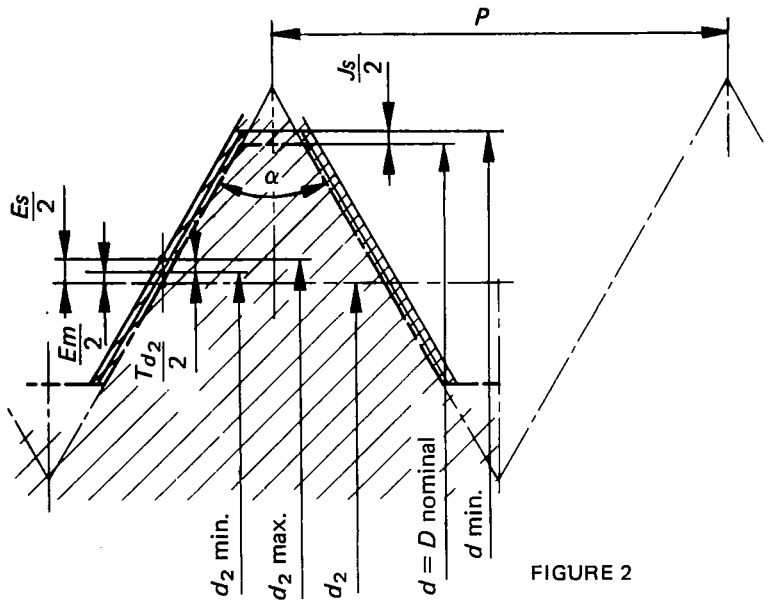


FIGURE 2

$d = D$ = nominal diameter

d min. = permissible minimum major diameter

Js = minimum clearance on major diameter

$d_2 = D_2$ = pitch diameter

d_2 min. = minimum pitch diameter

d_2 max. = maximum pitch diameter

Es = upper deviation of pitch diameter

Em = lower deviation of pitch diameter

T_{d_2} = tolerance on pitch diameter

3.3 Tolerance classes of taps

For the production of nut classes of the following classes :

4H – 5H – 6H – 7H – 8H with zero minimum clearance,

4G – 5G – 6G with positive minimum clearance,

three tolerance classes have been accepted :

Class 1 – Class 2 – Class 3

The tolerances of these three classes are determined as indicated hereafter, in terms of a tolerance unit t, the value of which is equal to the pitch tolerance value T_{D_2}, grade 5 of the nut (extrapolated up to pitch 0,2 mm) :

$t = T_{D_2}$ grade 5 of the nut.

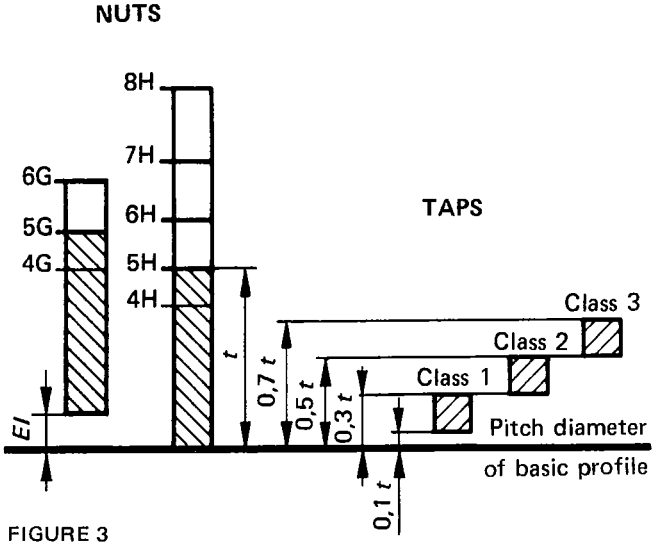


FIGURE 3

3.3.1 *Tolerance on pitch diameter*

The value for the tap pitch diameter tolerance T_{d_2} is the same for all three classes 1, 2 and 3 : it is equal to 20 % of t.

The position of the tolerance of the tap with respect to the basic pitch diameter results from the lower deviation Em, the values of which are (see figure 3) :

for tap class 1 : + 0,1 t

for tap class 2 : + 0,3 t

for tap class 3 : + 0,5 t

3.3.2 *Choice of tolerance class of the tap with respect to the class of thread to be produced*

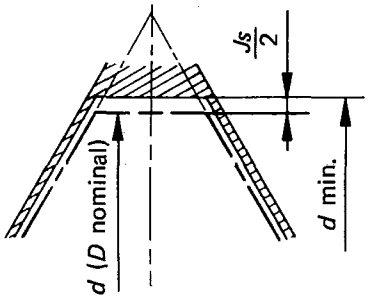
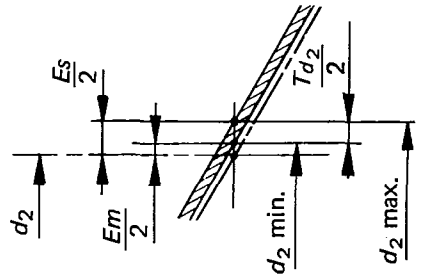
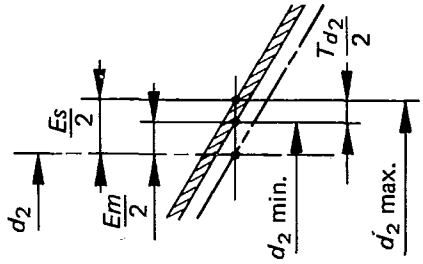
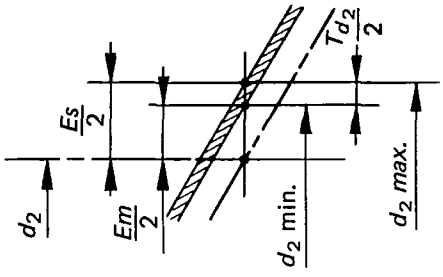
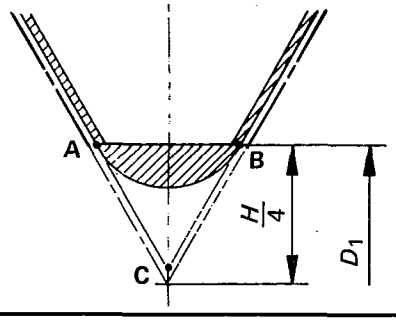
Unless otherwise specified, the taps of classes 1 to 3 will generally be used for the manufacture of nuts of the following classes :

- Class 1 : for nuts of classes 4H and 5H
- Class 2 : for nuts of classes 6H and also 4G and 5G
- Class 3 : for nuts of classes 7H – 8H and also 6G

This correspondance has, however, only an indicative nature, since the accuracy of tapping can vary as a function of a series of factors such as : the material to be tapped, the condition of the machine tool, the tapping attachment, the tapping speed, the lubricant, etc.

Users are therefore recommended to select in each case the most suitable class of tap for the manufacture of the required class of nut.

3.4 Calculation of tap thread dimensions of classes 1, 2 and 3

Class of tap	Minimum tolerance on tap major diameter $d = D$ of tap
all	 $d = D$ nominal diameter of tap $Js = 0{,}4\ t^*$ d min. $= D + Js$
	Tolerance on tap pitch diameter d_2
1	 $Em = 0{,}1\ t^*$ $Es = 0{,}3\ t^*$ d_2 min. $= d_2{}^{**} + Em$ d_2 max. $= d_2{}^{**} + Es$
2	 $Em = 0{,}3\ t^*$ $Es = 0{,}5\ t^*$ d_2 min. $= d_2{}^{**} + Em$ d_2 max. $= d_2{}^{**} + Es$
3	 $Em = 0{,}5\ t^*$ $Es = 0{,}7\ t^*$ d_2 min. $= d_2{}^{**} + Em$ d_2 max. $= d_2{}^{**} + Es$
	Tolerance on tap minor diameter
all	 No tolerance is specified on this diameter. The thread root is generally, but not mandatorily, with a rounded form and the profile of the radius blending with the flanks of the thread should lie, in principle, under the line AB which corresponds with the internal diameter D_1 of the basic ISO profile.

* t = tolerance unit = TD_2 pitch tolerance, grade 5 of the nut.
The values are given in ISO/R 965/I, section 9.

** The d_2 values correspond to the values of the pitch diameter D_2 of the nut in conformity with ISO/R 724.

4 MANUFACTURING TOLERANCES ON TAP THREADS

4.1 Major diameter *d*

The minimum major diameter *d* min. shall be equal to the nominal diameter *D* of the nut, plus deviation *Js*. Deviation *Js* shall be greater than or equal to 0,4 *t*.*

The maximum major diameter *d* max. is not fixed and is left to the manufacturer's judgement.

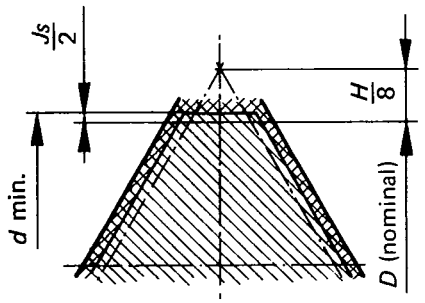


TABLE 1 — **Minimum deviation *Js* in micrometres**

Nominal diameter		Pitch	Minimum deviation *Js*
over	up to and including		
0,99	1,4	0,2	+ 20
		0,25	+ 22
		0,3	+ 24
1,4	2,8	0,2	+ 21
		0,25	+ 24
		0,35	+ 27
		0,4	+ 28
		0,45	+ 30
2,8	5,6	0,35	+ 28
		0,5	+ 32
		0,6	+ 36
		0,7	+ 38
		0,75	
		0,8	+ 40
5,6	11,2	0,75	+ 42
		1	+ 47
		1,25	+ 50
		1,5	+ 56
11,2	22,4	1	+ 50
		1,25	+ 56
		1,5	+ 60
		1,75	+ 64
		2	+ 68
		2,5	+ 72
22,4	45	1	+ 53
		1,5	+ 64
		2	+ 72
		3	+ 85
		3,5	+ 90
		4	+ 94
		4,5	+ 100
45	90	1,5	+ 68
		2	+ 76
		3	+ 90
		4	+ 100
		5	+ 106
		5,5	+ 112
		6	+ 120

* t = tolerance unit = TD_2, pitch tolerance, grade 5 of the nut.
(See ISO/R 965/I. The values given for the pitch of 0,2 have been obtained by extrapolation.)

4.2 Pitch diameter d_2

The maximum and minimum permissible values on the pitch diameters, d_2 max. and d_2 min., of the taps are calculated in terms of the deviations *Em* and *Es* given in Table 2.

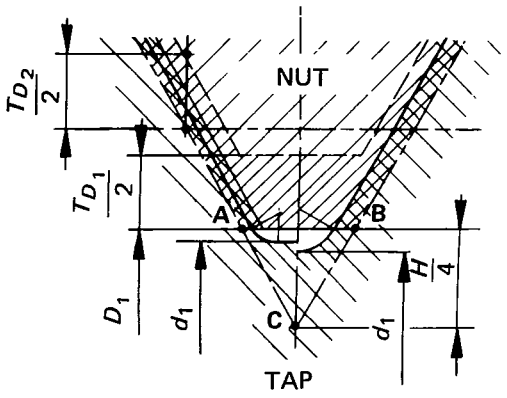
TABLE 2 — **Values of deviations *Em* and *Es* in micrometres**

Nominal diameter		Pitch	Deviations for pitch diameters *Em* and *Es*		
over	up to and including		classes 1	2	3
0,99	1,4	0,2	+ 15 + 5	—	—
		0,25	+ 17 + 6	—	—
		0,3	+ 18 + 6	+ 30 + 18	—
1,4	2,8	0,2	+ 16 + 5	—	—
		0,25	+ 18 + 6	—	—
		0,35	+ 20 + 7	+ 34 + 20	—
		0,4	+ 21 + 7	+ 36 + 21	—
		0,45	+ 23 + 8	+ 38 + 23	—
2,8	5,6	0,35	+ 21 + 7	+ 36 + 21	—
		0,5	+ 24 + 8	+ 40 + 24	+ 56 + 40
		0,6	+ 27 + 9	+ 45 + 27	+ 63 + 45
		0,7	+ 29 + 10	+ 48 + 29	+ 67 + 48
		0,75			
		0,8	+ 30 + 10	+ 50 + 30	+ 70 + 50
5,6	11,2	0,75	+ 32 + 11	+ 53 + 32	+ 74 + 53
		1	+ 35 + 12	+ 59 + 35	+ 83 + 59
		1,25	+ 38 + 13	+ 63 + 38	+ 88 + 63
		1,5	+ 42 + 14	+ 70 + 42	+ 98 + 70
11,2	22,4	1	+ 38 + 13	+ 63 + 38	+ 88 + 63
		1,25	+ 42 + 14	+ 70 + 42	+ 98 + 70
		1,5	+ 45 + 15	+ 75 + 45	+ 105 + 75
		1,75	+ 48 + 16	+ 80 + 48	+ 112 + 80
		2	+ 51 + 17	+ 85 + 51	+ 119 + 85
		2,5	+ 54 + 18	+ 90 + 54	+ 126 + 90
22,4	45	1	+ 40 + 13	+ 66 + 40	+ 92 + 66
		1,5	+ 48 + 16	+ 80 + 48	+ 112 + 80
		2	+ 54 + 18	+ 90 + 54	+ 126 + 90
		3	+ 64 + 21	+ 106 + 64	+ 148 + 106
		3,5	+ 67 + 22	+ 112 + 67	+ 157 + 112
		4	+ 71 + 24	+ 118 + 71	+ 165 + 118
		4,5	+ 75 + 25	+ 125 + 75	+ 175 + 125
45	90	1,5	+ 51 + 17	+ 85 + 51	+ 119 + 85
		2	+ 57 + 19	+ 95 + 57	+ 133 + 95
		3	+ 67 + 22	+ 112 + 67	+ 157 + 112
		4	+ 75 + 25	+ 125 + 75	+ 175 + 125
		5	+ 80 + 27	+ 133 + 80	+ 186 + 133
		5,5	+ 84 + 28	+ 140 + 84	+ 196 + 140
		6	+ 90 + 30	+ 150 + 90	+ 210 + 150

4.3 Minor diameter of tap d_1

No tolerance is specified on this diameter which is governed by the wear on the tool used to produce this thread.

The profile of the radius blending with the flanks of the thread should however lie, in principle, under the line AB which corresponds with the internal diameter D_1 of the basic ISO profile.



4.4 Tolerance on the angle α and the half-angle $\alpha/2$ of thread

The values for these tolerances are based on the pitch of the thread; they apply both to the angle α and to the half-angle $\alpha/2$ and shall be in accordance with the values of Table 3.

TABLE 3 — **Tolerances on the angles**

Pitch ranges P		Tolerances on angle α and 1/2 angle $\alpha/2$
Over	Up to and including	
0,2	0,4	± 40′
0,4	0,8	± 30′
0,8	1,5	± 25′
1,5	3	± 20′
3	6	± 15′

4.5 Cumulative pitch error T_p over any number of threads

This error is fixed at ± 0,05 % of the considered measuring length with a minimum of ± 0,008 mm.

5 DESIGNATION AND MARKING OF TAPS

The taps shall bear, after their dimensional designation (as indicated in ISO/R 529), the nominal diameter and, if necessary, the pitch of the thread, and the symbol ISO followed by the class of the tap, a dash being placed before the ISO symbol.

Examples :

For an M6 coarse pitch tap of class 2 :

M 6 — ISO 2

For an M 20 tap with pitch of 2 of class 1 :

M 20 X 2 — ISO 1

6 EXAMPLE OF CALCULATION OF THE DIMENSIONS OF THE THREADED PORTION OF A TAP

GROUND THREAD TAPS FOR ISO METRIC PITCHES

Example for an M 14 tap, class 2

Tap designation	M 14 – ISO 2
Tap characteristics	D = nominal diameter = 14 mm Pitch = 2 mm Threaded length = 30 mm
Basic data taken from ISO/R 724	$d_2 = D_2 =$ . . . . . 12,701 mm
Minimum major diameter (d min.)	d min. = $D + Js\ (0{,}4\ t)$ $D =$ . . . . . 14,000 mm $Js\ (0{,}4\ t) =$ . . . . . 0,068 mm d min. = 14,000 + 0,068 = 14,068 mm (see 4.1)
Minimum pitch diameter (d_2 min.)	d_2 min. = $d_2 + Em\ (0{,}3\ t)$ d_2 (basic) = ... 12,701 mm $Em\ (0{,}3\ t) =$ . . . . . 0,051 mm d_2 min. = 12,701 + 0,051 = 12,752 mm (see 4.2)
Maximum pitch diameter (d_2 max.)	d_2 max. = $d_2 + Es\ (0{,}5\ t)$ d_2 (basic) = ... 12,701 mm $Es\ (0{,}5\ t) =$ . . . . . 0,085 mm d_2 max. = 12,701 + 0,085 = 12,786 mm (see 4.2)
Minor diameter	Not specified (see 4.3)
Tolerance on the angle (α) **or half-angle** ($\alpha/2$) **of pitch**	For a pitch of 2 mm ± 20′ (see 4.4)
Cumulative pitch error T_p over any number of threads	(see 4.5)

$t = T_{D2}$: pitch tolerance, grade 5 of the nut. (See 3.4.)

ANNEX A

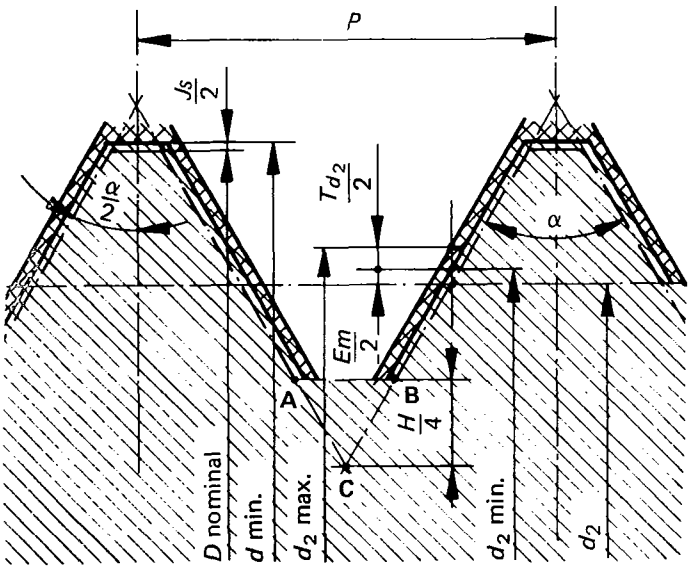
GROUND THREAD TAPS FOR ISO METRIC THREADS OF COARSE PITCH

Dimensions and manufacturing tolerances for the threaded portion of taps of :

Class 1 (for classes 4H and 5H of nuts)

Class 2 (for classes 6H, and 4G and 5G of nuts)

Class 3 (for classes 7H and 8H, and 6G of nuts)



Class of taps			All classes		
Thread			Major diameter		
Designation	d nominal	Pitch P	Min. deviation	Min.	Basic pitch diameter
			0,4 t	d min.	d_2
M 1	1	0,25	+ 0,022	1,022	0,838
M 1,1	1,1			1,122	0,938
M 1,2	1,2			1,222	1,038
M 1,4	1,4	0,3	+ 0,024	1,424	1,205
M 1,6	1,6	0,35	+ 0,027	1,627	1,373
M 1,8	1,8			1,827	1,573
M 2	2	0,4	+ 0,028	2,028	1,740
M 2,2	2,2	0,45	+ 0,030	2,230	1,908
M 2,5	2,5			2,530	2,208
M 3	3	0,5	+ 0,032	3,032	2,675
M 3,5	3,5	0,6	+ 0,036	3,536	3,110
M 4	4	0,7	+ 0,038	4,038	3,545
M 4,5	4,5	0,75		4,538	4,013
M 5	5	0,8	+ 0,040	5,040	4,480
M 6	6	1	+ 0,047	6,047	5,350
M 7	7			7,047	6,350
M 8	8	1,25	+ 0,050	8,050	7,188
M 9	9			9,050	8,188
M 10	10	1,5	+ 0,056	10,056	9,026
M 11	11			11,056	10,026
M 12	12	1,75	+ 0,064	12,064	10,863
M 14	14	2	+ 0,068	14,068	12,701
M 16	16			16,068	14,701
M 18	18	2,5	+ 0,072	18,072	16,376
M 20	20			20,072	18,376
M 22	22			22,072	20,376
M 24	24	3	+ 0,085	24,085	22,051
M 27	27			27,085	25,051
M 30	30	3,5	+ 0,090	30,090	27,727
M 33	33			33,090	30,727
M 36	36	4	+ 0,094	36,094	33,402
M 39	39			39,094	36,402
M 42	42	4,5	+ 0,100	42,100	39,077
M 45	45			45,100	42,077
M 48	48	5	+ 0,106	48,106	44,752
M 52	52			52,106	48,752
M 56	56	5,5	+ 0,112	56,112	52,428
M 60	60			60,112	56,428
M 64	64	6	+ 0,120	64,120	60,103
M 68	68			68,120	64,103

Minor diameter of tap

No tolerance is specified on this diameter. The thread root is generally, but not mandatorily, with a rounded form and the profile of the radius blending with the flanks of the thread, should lie, in principle, under the line AB which corresponds with the internal diameter D_1 of the basic ISO profile.

Cumulative pitch error T_p over any number of threads

This error is fixed at ± 0,05 % of the considered measuring length with a minimum of ± 0,008 mm.

Dimensions in millimetres

Class 1				Class 2				Class 3				Toler. on α and $\alpha/2$	d nominal
Pitch diameter													
Min. deviat.	min.	Toler.	max.	Min. deviat.	min.	Toler.	max.	Min. deviat.	min.	Toler.	max.		
Em	d_2 min.	T_{d_2}	d_2 max.	Em	d_2 min.	T_{d_2}	d_2 max.	Em	d_2 min.	T_{d_2}	d_2 max.		
	0,844		0,855										1
	0,944	+ 0,011	0,955										1,1
+ 0,006	1,044		1,055										1,2
	1,211	+ 0,012	1,223	+ 0,018	1,223	+ 0,012	1,235					± 40′	1,4
	1,380	+ 0,013	1,393	+ 0,020	1,393	+ 0,014	1,407						1,6
+ 0,007	1,580		1,593		1,593		1,607						1,8
	1,747	+ 0,014	1,761	+ 0,021	1,761	+ 0,015	1,776						2
	1,916	+ 0,015	1,931	+ 0,023	1,931	+ 0,015	1,946						2,2
+ 0,008	2,216		2,231		2,231		2,246						2,5
	2,683	+ 0,016	2,699	+ 0,024	2,699	+ 0,016	2,715	+ 0,040	2,715	+ 0,016	2,731		3
+ 0,009	3,119	+ 0,018	3,137	+ 0,027	3,137	+ 0,018	3,155	+ 0,045	3,155	+ 0,018	3,173	± 30′	3,5
	3,555	+ 0,019	3,574	+ 0,029	3,574	+ 0,019	3,593	+ 0,048	3,593	+ 0,019	3,612		4
+ 0,010	4,023		4,042		4,042		4,061		4,061		4,080		4,5
	4,490	+ 0,020	4,510	+ 0,030	4,510	+ 0,020	4,530	+ 0,050	4,530	+ 0,020	4,550		5
+ 0,012	5,362	+ 0,023	5,385	+ 0,035	5,385	+ 0,024	5,409	+ 0,059	5,409	+ 0,024	5,433		6
	6,362		6,385		6,385		6,409		6,409		6,433		7
+ 0,013	7,201	+ 0,025	7,226	+ 0,038	7,226	+ 0,025	7,251	+ 0,063	7,251	+ 0,025	7,276	± 25′	8
	8,201		8,226		8,226		8,251		8,251		8,276		9
+ 0,014	9,040	+ 0,028	9,068	+ 0,042	9,068	+ 0,028	9,096	+ 0,070	9,096	+ 0,028	9,124		10
	10,040		10,068		10,068		10,096		10,096		10,124		11
+ 0,016	10,879	+ 0,032	10,911	+ 0,048	10,911	+ 0,032	10,943	+ 0,080	10,943	+ 0,032	10,975		12
+ 0,017	12,718	+ 0,034	12,752	+ 0,051	12,752	+ 0,034	12,786	+ 0,085	12,786	+ 0,034	12,820		14
	14,718		14,752		14,752		14,786		14,786		14,820		16
	16,394		16,430		16,430		16,466		16,466		16,502	± 20′	18
+ 0,018	18,394	+ 0,036	18,430	+ 0,054	18,430	+ 0,036	18,466	+ 0,090	18,466	+ 0,036	18,502		20
	20,394		20,430		20,430		20,466		20,466		20,502		22
+ 0,021	22,072	+ 0,043	22,115	+ 0,064	22,115	+ 0,042	22,157	+ 0,106	22,157	+ 0,042	22,199		24
	25,072		25,115		25,115		25,157		25,157		25,199		27
+ 0,022	27,749	+ 0,045	27,794	+ 0,067	27,794	+ 0,045	27,839	+ 0,112	27,839	+ 0,045	27,884		30
	30,749		30,794		30,794		30,839		30,839		30,884		33
+ 0,024	33,426	+ 0,047	33,473	+ 0,071	33,473	+ 0,047	33,520	+ 0,118	33,520	+ 0,047	33,567		36
	36,426		36,473		36,473		36,520		36,520		36,567		39
+ 0,025	39,102	+ 0,050	39,152	+ 0,075	39,152	+ 0,050	39,202	+ 0,125	39,202	+ 0,050	39,252		42
	42,102		42,152		42,152		42,202		42,202		42,252	± 15′	45
+ 0,027	44,779	+ 0,053	44,832	+ 0,080	44,832	+ 0,053	44,885	+ 0,133	44,885	+ 0,053	44,938		48
	48,779		48,832		48,832		48,885		48,885		48,938		52
+ 0,028	52,456	+ 0,056	52,512	+ 0,084	52,512	+ 0,056	52,568	+ 0,140	52,568	+ 0,056	52,624		56
	56,456		56,512		56,512		56,568		56,568		56,624		60
+ 0,030	60,133	+ 0,060	60,193	+ 0,090	60,193	+ 0,060	60,253	+ 0,150	60,253	+ 0,060	60,313		64
	64,133		64,193		64,193		64,253		64,253		64,313		68

ANNEX B

GROUND THREAD TAPS FOR ISO METRIC THREADS OF FINE PITCH

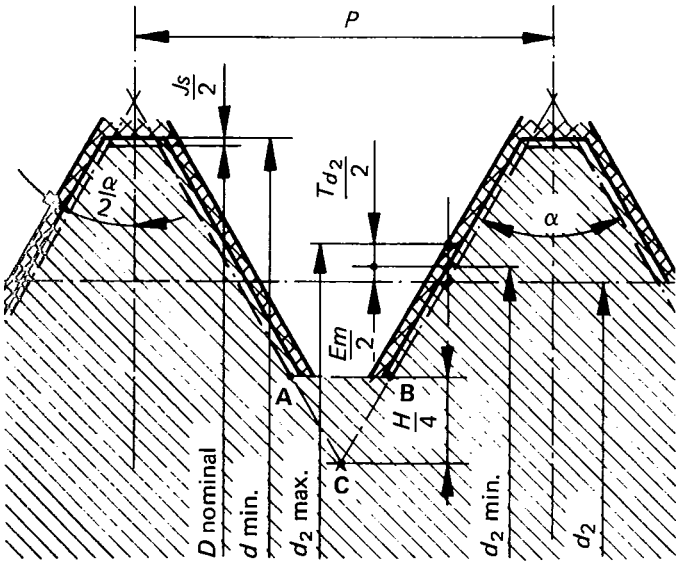
Diameters of 1 to 32 mm

Dimensions and manufacturing tolerances for the threaded portion of taps of :

Class 1 (for classes 4H and 5H of nuts)

Class 2 (for classes 6H, and 4G and 5G of nuts)

Class 3 (for classes 7H and 8H, and 6G of nuts)



Class of taps			All classes		
Thread			Major diameter		
Designation	*d* nominal	Pitch *P*	Min. deviation	Min.	Basic pitch diameter
			0,4 *t*	*d* min.	d_2
M 1 × 0,2	1	0,2	+ 0,020	1,020	0,870
M 1,1 × 0,2	1,1			1,120	0,970
M 1,2 × 0,2	1,2			1,220	1,070
M 1,4 × 0,2	1,4		+ 0,021	1,421	1,270
M 1,6 × 0,2	1,6			1,621	1,470
M 1,8 × 0,2	1,8			1,821	1,670
M 2 × 0,25	2	0,25	+ 0,024	2,024	1,838
M 2,2 × 0,25	2,2			2,224	2,038
M 2,5 × 0,35	2,5	0,35	+ 0,027	2,527	2,273
M 3 × 0,35	3		+ 0,028	3,028	2,773
M 3,5 × 0,35	3,5			3,528	3,273
M 4 × 0,5	4	0,5	+ 0,032	4,032	3,675
M 4,5 × 0,5	4,5			4,532	4,175
M 5 × 0,5	5			5,032	4,675
M 5,5 × 0,5	5,5			5,532	5,175
M 6 × 0,75	6	0,75	+ 0,042	6,042	5,513
M 7 × 0,75	7			7,042	6,513
M 8 × 1	8	1	+ 0,047	8,047	7,350
M 9 × 1	9			9,047	8,350
M 10 × 1	10			10,047	9,350
M 10 × 1,25		1,25	+ 0,050	10,050	9,188
M 12 × 1,25	12		+ 0,056	12,056	11,188
M 12 × 1,5		1,5	+ 0,060	12,060	11,026
M 14 × 1,25	14	1,25	+ 0,056	14,056	13,188
M 14 × 1,5		1,5	+ 0,060	14,060	13,026
M 15 × 1,5	15			15,060	14,026
M 16 × 1,5	16			16,060	15,026
M 17 × 1,5	17			17,060	16,026
M 18 × 1,5	18			18,060	17,026
M 18 × 2		2	+ 0,068	18,068	16,701
M 20 × 1,5	20	1,5	+ 0,060	20,060	19,026
M 20 × 2		2	+ 0,068	20,068	18,701
M 22 × 1,5	22	1,5	+ 0,060	22,060	21,026
M 22 × 2		2	+ 0,068	22,068	20,701
M 24 × 1,5	24	1,5	+ 0,064	24,064	23,026
M 24 × 2		2	+ 0,072	24,072	22,701
M 25 × 1,5	25	1,5	+ 0,064	25,064	24,026
M 25 × 2		2	+ 0,072	25,072	23,701
M 27 × 1,5	27	1,5	+ 0,064	27,064	26,026
M 27 × 2		2	+ 0,072	27,072	25,701
M 28 × 1,5	28	1,5	+ 0,064	28,064	27,026
M 28 × 2		2	+ 0,072	28,072	26,701
M 30 × 1,5	30	1,5	+ 0,064	30,064	29,026
M 30 × 2		2	+ 0,072	30,072	28,701
M 30 × 3		3	+ 0,085	30,085	28,051
M 32 × 1,5	32	1,5	+ 0,064	32,064	31,026
M 32 × 2		2	+ 0,072	32,072	30,701

Minor diameter of tap

No tolerance is specified on this diameter. The thread root is generally, but not mandatorily, with a rounded form and the profile of the radius blending with the flanks of the thread, should lie, in principle, under the line AB which corresponds with the internal diameter D_1 of the basic ISO profile.

Cumulative pitch error T_p over any number of threads

This error is fixed at ± 0,05 % of the considered measuring length with a minimum of ± 0,008 mm.

Dimensions in millimetres

Class 1				Class 2				Class 3				Toler. on α and $\alpha/2$	d nominal
Pitch diameter													
Min. deviat.	min.	Toler.	max.	Min. deviat.	min.	Toler.	max.	Min. deviat.	min.	Toler.	max.		
Em	d_2 min.	T_{d_2}	d_2 max.	Em	d_2 min.	T_{d_2}	d_2 max.	Em	d_2 min.	T_{d_2}	d_2 max.		
	0,875		0,885										1
	0,975		0,985										1,1
+ 0,005	1,075	+ 0,010	1,085									± 40′	1,2
	1,275		1,285										1,4
	1,475		1,485										1,6
	1,675		1,685										1,8
+ 0,006	1,844	+ 0,012	1,856										2
	2,044		2,056										2,2
	2,280	+ 0,013	2,293	+ 0,020	2,293	+ 0,014	2,307					± 40′	2,5
+ 0,007	2,780	+ 0,014	2,794	+ 0,021	2,794	+ 0,015	2,809						3
	3,280		3,294		3,294		3,309						3,5
	3,683		3,699		3,699		3,715		3,715		3,731		4
	4,183		4,199		4,199		4,215		4,215		4,231		4,5
+ 0,008	4,683	+ 0,016	4,699	+ 0,024	4,699	+ 0,016	4,715	+ 0,040	4,715	+ 0,016	4,731	± 30′	5
	5,183		5,199		5,199		5,215		5,215		5,231		5,5
+ 0,011	5,524	+ 0,021	5,545	+ 0,032	5,545	+ 0,021	5,566	+ 0,053	5,566	+ 0,021	5,587		6
	6,524		6,545		6,545		6,566		6,566		6,587		7
	7,362		7,385		7,385		7,409		7,409		7,433		8
+ 0,012	8,362	+ 0,023	8,385	+ 0,035	8,385	+ 0,024	8,409	+ 0,059	8,409	+ 0,024	8,433		9
	9,362		9,385		9,385		9,409		9,409		9,433		10
+ 0,013	9,201	+ 0,025	9,226	+ 0,038	9,226	+ 0,025	9,251	+ 0,063	9,251	+ 0,025	9,276		
+ 0,014	11,202	+ 0,028	11,230	+ 0,042	11,230	+ 0,028	11,258	+ 0,070	11,258	+ 0,028	11,286		12
+ 0,015	11,041	+ 0,030	11,071	+ 0,045	11,071	+ 0,030	11,101	+ 0,075	11,101	+ 0,030	11,131	± 25′	
+ 0,014	13,202	+ 0,028	13,230	+ 0,042	13,230	+ 0,028	13,258	+ 0,070	13,258	+ 0,028	13,286		14
	13,041		13,071		13,071		13,101		13,101		13,131		
	14,041		14,071		14,071		14,101		14,101		14,131		15
+ 0,015	15,041	+ 0,030	15,071	+ 0,045	15,071	+ 0,030	15,101	+ 0,075	15,101	+ 0,030	15,131		16
	16,041		16,071		16,071		16,101		16,101		16,131		17
	17,041		17,071		17,071		17,101		17,101		17,131		18
+ 0,017	16,718	+ 0,034	16,752	+ 0,051	16,752	+ 0,034	16,786	+ 0,085	16,786	+ 0,034	16,820	± 20′	
+ 0,015	19,041	+ 0,030	19,071	+ 0,045	19,071	+ 0,030	19,101	+ 0,075	19,101	+ 0,030	19,131	± 25′	20
+ 0,017	18,718	+ 0,034	18,752	+ 0,051	18,752	+ 0,034	18,786	+ 0,085	18,786	+ 0,034	18,820	± 20′	
+ 0,015	21,041	+ 0,030	21,071	+ 0,045	21,071	+ 0,030	21,101	+ 0,075	21,101	+ 0,030	21,131	± 25′	22
+ 0,017	20,718	+ 0,034	20,752	+ 0,051	20,752	+ 0,034	20,786	+ 0,085	20,786	+ 0,034	20,820	± 20′	
+ 0,016	23,042	+ 0,032	23,074	+ 0,048	23,074	+ 0,032	23,106	+ 0,080	23,106	+ 0,032	23,138	± 25′	24
+ 0,018	22,719	+ 0,036	22,755	+ 0,054	22,755	+ 0,036	22,791	+ 0,090	22,791	+ 0,036	22,827	± 20′	
+ 0,016	24,042	+ 0,032	24,074	+ 0,048	24,074	+ 0,032	24,106	+ 0,080	24,106	+ 0,032	24,138	± 25′	25
+ 0,018	23,719	+ 0,036	23,755	+ 0,054	23,755	+ 0,036	23,791	+ 0,090	23,791	+ 0,036	23,827	± 20′	
+ 0,016	26,042	+ 0,032	26,074	+ 0,048	26,074	+ 0,032	26,106	+ 0,080	26,106	+ 0,032	26,138	± 25′	27
+ 0,018	25,719	+ 0,036	25,755	+ 0,054	25,755	+ 0,036	25,791	+ 0,090	25,791	+ 0,036	25,827	± 20′	
+ 0,016	27,042	+ 0,032	27,074	+ 0,048	27,074	+ 0,032	27,106	+ 0,080	27,106	+ 0,032	27,138	± 25′	28
+ 0,018	26,719	+ 0,036	26,755	+ 0,054	26,755	+ 0,036	26,791	+ 0,090	26,791	+ 0,036	26,827	± 20′	
+ 0,016	29,042	+ 0,032	29,074	+ 0,048	29,074	+ 0,032	29,106	+ 0,080	29,106	+ 0,032	29,138	± 25′	30
+ 0,018	28,719	+ 0,036	28,755	+ 0,054	28,755	+ 0,036	28,791	+ 0,090	28,791	+ 0,036	28,827	± 20′	
+ 0,021	28,072	+ 0,043	28,115	+ 0,064	28,115	+ 0,042	28,157	+ 0,106	28,157	+ 0,042	28,199		
+ 0,016	31,042	+ 0,032	31,074	+ 0,048	31,074	+ 0,032	31,106	+ 0,080	31,106	+ 0,032	31,138	± 25′	32
+ 0,018	30,719	+ 0,036	30,755	+ 0,054	30,755	+ 0,036	30,791	+ 0,090	30,791	+ 0,036	30,827	± 20′	

GROUND THREAD TAPS FOR ISO METRIC THREADS OF FINE PITCH (concluded)

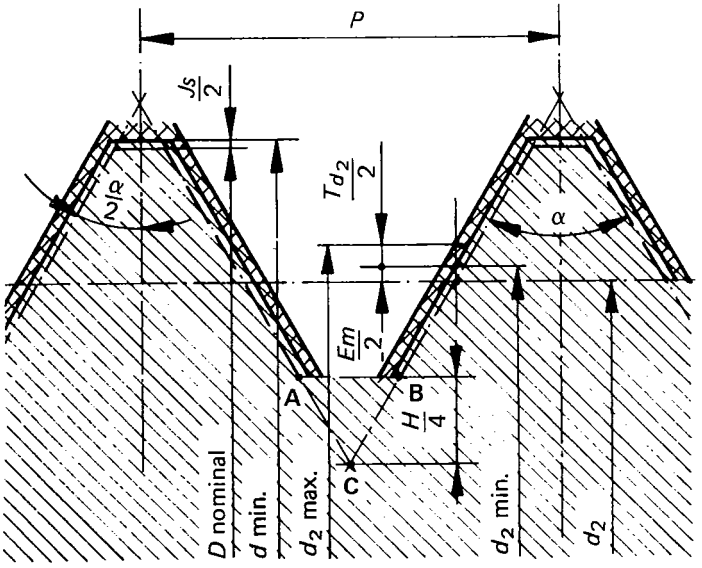
Diameters of 33 to 90 mm

Dimensions and manufacturing tolerances for the threaded portion of taps of :

Class 1 (for classes 4H and 5H of nuts)

Class 2 (for classes 6H, and 4G and 5G of nuts)

Class 3 (for classes 7H and 8H, and 6G of nuts)



Class of taps			All classes		
Thread			Major diameter		
Designation	d nominal	Pitch P	Min. deviation	Min.	Basic pitch diameter
			0,4 t	d min.	d_2
M 33 × 1,5	33	1,5	+ 0,064	33,064	32,026
M 33 × 2		2	+ 0,072	33,072	31,701
M 33 × 3		3	+ 0,085	33,085	31,051
M 35 × 1,5	35	1,5	+ 0,064	35,064	34,026
M 36 × 1,5	36			36,064	35,026
M 36 × 2		2	+ 0,072	36,072	34,701
M 36 × 3		3	+ 0,085	36,085	34,051
M 39 × 1,5	39	1,5	+ 0,064	39,064	38,026
M 39 × 2		2	+ 0,072	39,072	37,701
M 39 × 3		3	+ 0,085	39,085	37,051
M 40 × 1,5	40	1,5	+ 0,064	40,064	39,026
M 40 × 2		2	+ 0,072	40,072	38,701
M 40 × 3		3	+ 0,085	40,085	38,051
M 42 × 1,5	42	1,5	+ 0,064	42,064	41,026
M 42 × 2		2	+ 0,072	42,072	40,701
M 42 × 3		3	+ 0,085	42,085	40,051
M 42 × 4		4	+ 0,094	42,094	39,402
M 45 × 1,5	45	1,5	+ 0,064	45,064	44,026
M 45 × 2		2	+ 0,072	45,072	43,701
M 45 × 3		3	+ 0,085	45,085	43,051
M 45 × 4		4	+ 0,094	45,094	42,402
M 48 × 1,5	48	1,5	+ 0,068	48,068	47,026
M 48 × 2		2	+ 0,076	48,076	46,701
M 48 × 3		3	+ 0,090	48,090	46,051
M 48 × 4		4	+ 0,100	48,100	45,402
M 50 × 1,5	50	1,5	+ 0,068	50,068	49,026
M 50 × 2		2	+ 0,076	50,076	48,701
M 50 × 3		3	+ 0,090	50,090	48,051
M 52 × 1,5	52	1,5	+ 0,068	52,068	51,026
M 52 × 2		2	+ 0,076	52,076	50,701
M 52 × 3		3	+ 0,090	52,090	50,051
M 52 × 4		4	+ 0,100	52,100	49,402
M 55 × 1,5	55	1,5	+ 0,068	55,068	54,026
M 55 × 2		2	+ 0,076	55,076	53,701
M 55 × 3		3	+ 0,090	55,090	53,051
M 55 × 4		4	+ 0,100	55,100	52,402
M 56 × 1,5	56	1,5	+ 0,068	56,068	55,026
M 56 × 2		2	+ 0,076	56,076	54,701
M 56 × 3		3	+ 0,090	56,090	54,051
M 56 × 4		4	+ 0,100	56,100	53,402
M 70 × 6	70	6	+ 0,120	70,120	66,103
M 72 × 6	72			72,120	68,103
M 75 × 6	75			75,120	71,103
M 76 × 6	76			76,120	72,103
M 80 × 6	80			80,120	76,103
M 85 × 6	85			85,120	81,103
M 90 × 6	90			90,120	86,103

Minor diameter of tap

No tolerance is specified on this diameter. The thread root is generally, but not mandatorily, with a rounded form and the profile of the radius blending with the flanks of the thread, should lie, in principle, under the line AB which corresponds with the internal diameter D_1 of the basic ISO profile.

Cumulative pitch error T_p over any number of threads

This error is fixed at ± 0,05 % of the considered measuring length with a minimum of ± 0,008 mm.

Dimensions in millimetres

Class 1				Class 2				Class 3				Toler. on α and $\alpha/2$	d nominal
Pitch diameter													
Min. deviat.	min.	Toler.	max.	Min. deviat.	min.	Toler.	max.	Min. deviat.	min.	Toler.	max.		
Em	d_2 min.	T_{d_2}	d_2 max.	Em	d_2 min.	T_{d_2}	d_2 max.	Em	d_2 min.	T_{d_2}	d_2 max.		
+ 0,016	32,042	+ 0,032	32,074	+ 0,048	32,074	+ 0,032	32,106	+ 0,080	32,106	+ 0,032	32,138	± 25 '	
+ 0,018	31,719	+ 0,036	31,755	+ 0,054	31,755	+ 0,036	31,791	+ 0,090	31,791	+ 0,036	31,827	± 20 '	33
+ 0,021	31,072	+ 0,043	31,115	+ 0,064	31,115	+ 0,042	31,157	+ 0,106	31,157	+ 0,042	31,199		
+ 0,016	34,042	+ 0,032	34,074	+ 0,048	34,074	+ 0,032	34,106	+ 0,080	34,106	+ 0,032	34,138	± 25 '	35
	35,042		35,074		35,074		35,106		35,106		35,138		
+ 0,018	34,719	+ 0,036	34,755	+ 0,054	34,755	+ 0,036	34,791	+ 0,090	34,791	+ 0,036	34,827	± 20 '	36
+ 0,021	34,072	+ 0,043	34,115	+ 0,064	34,115	+ 0,042	34,157	+ 0,106	34,157	+ 0,042	34,199		
+ 0,016	38,042	+ 0,032	38,074	+ 0,048	38,074	+ 0,032	38,106	+ 0,080	38,106	+ 0,032	38,138	± 25 '	
+ 0,018	37,719	+ 0,036	37,755	+ 0,054	37,755	+ 0,036	37,791	+ 0,090	37,791	+ 0,036	37,827	± 20 '	39
+ 0,021	37,072	+ 0,043	37,115	+ 0,064	37,115	+ 0,042	37,157	+ 0,106	37,157	+ 0,042	37,199		
+ 0,016	39,042	+ 0,032	39,074	+ 0,048	39,074	+ 0,032	39,106	+ 0,080	39,106	+ 0,032	39,138	± 25 '	
+ 0,018	38,719	+ 0,036	38,755	+ 0,054	38,755	+ 0,036	38,791	+ 0,090	38,791	+ 0,036	38,827	± 20 '	40
+ 0,021	38,072	+ 0,043	38,115	+ 0,064	38,115	+ 0,042	38,157	+ 0,106	38,157	+ 0,042	38,199		
+ 0,016	41,042	+ 0,032	41,074	+ 0,048	41,074	+ 0,032	41,106	+ 0,080	41,106	+ 0,032	41,138	± 25 '	
+ 0,018	40,719	+ 0,036	40,755	+ 0,054	40,755	+ 0,036	40,791	+ 0,090	40,791	+ 0,036	40,827	± 20 '	42
+ 0,021	40,072	+ 0,043	40,115	+ 0,064	40,115	+ 0,042	40,157	+ 0,106	40,157	+ 0,042	40,199		
+ 0,024	39,426	+ 0,047	39,473	+ 0,071	39,473	+ 0,047	39,520	+ 0,118	39,520	+ 0,047	39,567	± 15 '	
+ 0,016	44,042	+ 0,032	44,074	+ 0,048	44,074	+ 0,032	44,106	+ 0,080	44,106	+ 0,032	44,138	± 25 '	
+ 0,018	43,719	+ 0,036	43,755	+ 0,054	43,755	+ 0,036	43,791	+ 0,090	43,791	+ 0,036	43,827	± 20 '	45
+ 0,021	43,072	+ 0,043	43,115	+ 0,064	43,115	+ 0,042	43,157	+ 0,106	43,157	+ 0,042	43,199		
+ 0,024	42,426	+ 0,047	42,473	+ 0,071	42,473	+ 0,047	42,520	+ 0,118	42,520	+ 0,047	42,567	± 15 '	
+ 0,017	47,043	+ 0,034	47,077	+ 0,051	47,077	+ 0,034	47,111	+ 0,085	47,111	+ 0,034	47,145	± 25 '	
+ 0,019	46,720	+ 0,038	46,758	+ 0,057	46,758	+ 0,038	46,796	+ 0,095	46,796	+ 0,038	46,834	± 20 '	48
+ 0,022	46,073	+ 0,045	46,118	+ 0,067	46,118	+ 0,045	46,163	+ 0,112	46,163	+ 0,045	46,208		
+ 0,025	45,427	+ 0,050	45,477	+ 0,075	45,477	+ 0,050	45,527	+ 0,125	45,527	+ 0,050	45,577	± 15 '	
+ 0,017	49,043	+ 0,034	49,077	+ 0,051	49,077	+ 0,034	49,111	+ 0,085	49,111	+ 0,034	49,145	± 25 '	
+ 0,019	48,720	+ 0,038	48,758	+ 0,057	48,758	+ 0,038	48,796	+ 0,095	48,796	+ 0,038	48,834	± 20 '	50
+ 0,022	48,073	+ 0,045	48,118	+ 0,067	48,118	+ 0,045	48,163	+ 0,112	48,163	+ 0,045	48,208		
+ 0,017	51,043	+ 0,034	51,077	+ 0,051	51,077	+ 0,034	51,111	+ 0,085	51,111	+ 0,034	51,145	± 25 '	
+ 0,019	50,720	+ 0,038	50,758	+ 0,057	50,758	+ 0,038	50,796	+ 0,095	50,796	+ 0,038	50,834	± 20 '	52
+ 0,022	50,073	+ 0,045	50,118	+ 0,067	50,118	+ 0,045	50,163	+ 0,112	50,163	+ 0,045	50,208		
+ 0,025	49,427	+ 0,050	49,477	+ 0,075	49,477	+ 0,050	49,527	+ 0,125	49,527	+ 0,050	49,577	± 15 '	
+ 0,017	54,043	+ 0,034	54,077	+ 0,051	54,077	+ 0,034	54,111	+ 0,085	54,111	+ 0,034	54,145	± 25 '	
+ 0,019	53,720	+ 0,038	53,758	+ 0,057	53,758	+ 0,038	53,796	+ 0,095	53,796	+ 0,038	53,834	± 20 '	55
+ 0,022	53,073	+ 0,045	53,118	+ 0,067	53,118	+ 0,045	53,163	+ 0,112	53,163	+ 0,045	53,208		
+ 0,025	52,427	+ 0,050	52,477	+ 0,075	52,477	+ 0,050	52,527	+ 0,125	52,527	+ 0,050	52,577	± 15 '	
+ 0,017	55,043	+ 0,034	55,077	+ 0,051	55,077	+ 0,034	55,111	+ 0,085	55,111	+ 0,034	55,145	± 25 '	
+ 0,019	54,720	+ 0,038	54,758	+ 0,057	54,758	+ 0,038	54,796	+ 0,095	54,796	+ 0,038	54,834	± 20 '	56
+ 0,022	54,073	+ 0,045	54,118	+ 0,067	54,118	+ 0,045	54,163	+ 0,112	54,163	+ 0,045	54,208		
+ 0,025	53,427	+ 0,050	53,477	+ 0,075	53,477	+ 0,050	53,527	+ 0,125	53,527	+ 0,050	53,577	± 15 '	
	66,133		66,193		66,193		66,253		66,253		66,313		70
	68,133		68,193		68,193		68,253		68,253		68,313		72
	71,133		71,193		71,193		71,253		71,253		71,313		75
+ 0,030	72,133	+ 0,060	72,193	+ 0,090	72,193	+ 0,060	72,253	+ 0,150	72,253	+ 0,060	72,313	± 15 '	76
	76,133		76,193		76,193		76,253		76,253		76,313		80
	81,133		81,193		81,193		81,253		81,253		81,313		85
	86,133		86,193		86,193		86,253		86,253		86,313		90