International Standard 5969

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Ground thread taps for pipe threads G series and Rp series — Tolerances on the threaded portion

Tarauds à filets rectifiés pour filetages gaz séries G et Rp — Tolérances sur la partie taillée

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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.

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It has been approved by the member bodies of the following countries :

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Czechoslovakia
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Ground thread taps for pipe threads G series and Rp series — Tolerances on the threaded portion

1 Scope and field of application

This International Standard specifies the deviations and tolerances on the major diameter and the pitch diameter together with the limits of these diameters for ground thread taps intended for production of pipe threads G and Rp series according to ISO 228/1 and ISO 7/1 respectively.

The internal threads produced with these taps are conventionally designated by the simplified denomination of "nut".

2 References

ISO 7/1, *Pipe threads where pressure-tight joints are made on the threads — Part 1 : Designation, dimensions and tolerances.*

ISO 228/1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1 : Designation, dimensions and tolerances.*

ISO 2284, *Hand taps for pipe threads for parallel and taper threads — General dimensions and marking.*

ISO 2857, *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.*

3 Tolerances

3.1 Basic data

3.1.1 Thread profile of nuts

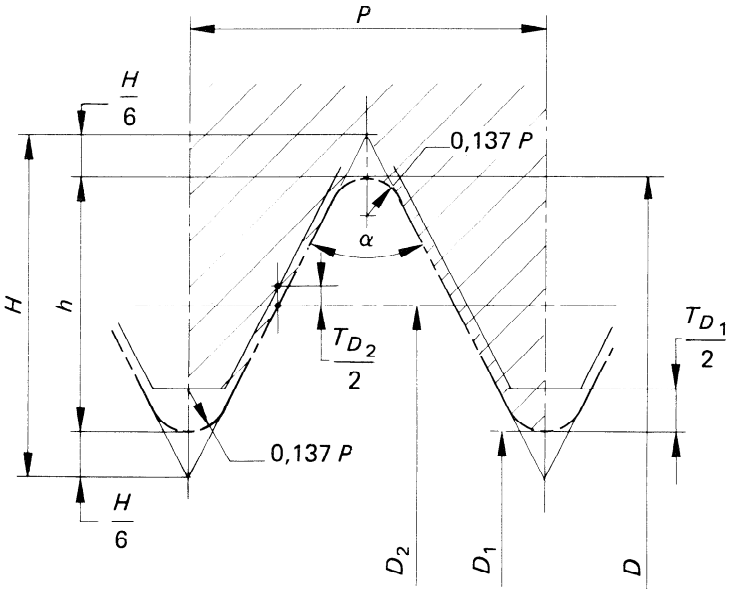

Figure 1 — G series

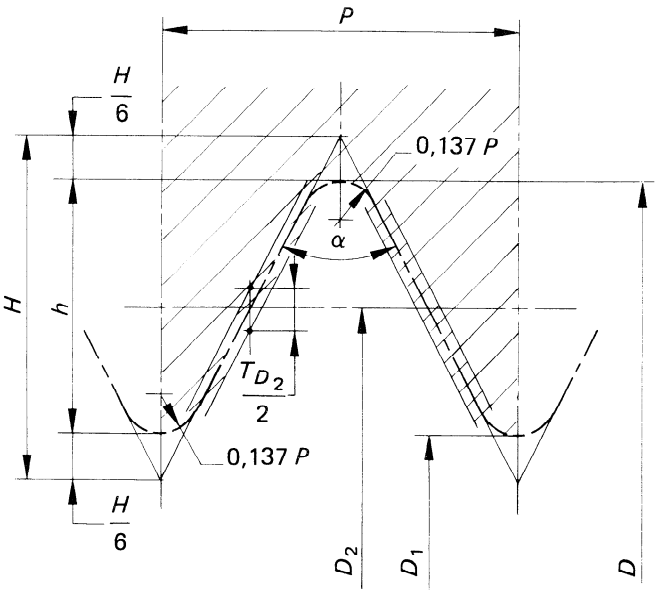

Figure 2 — Rp series

D = basic major diameter
D_1 = basic minor diameter
D_2 = pitch diameter
P = pitch of thread
α = included angle of thread (55°)

H = height of fundamental triangle
T_{D_1} = minor diameter tolerance
T_{D_2} = pitch diameter tolerance
h = basic depth of thread

3.1.2 Thread profile of taps

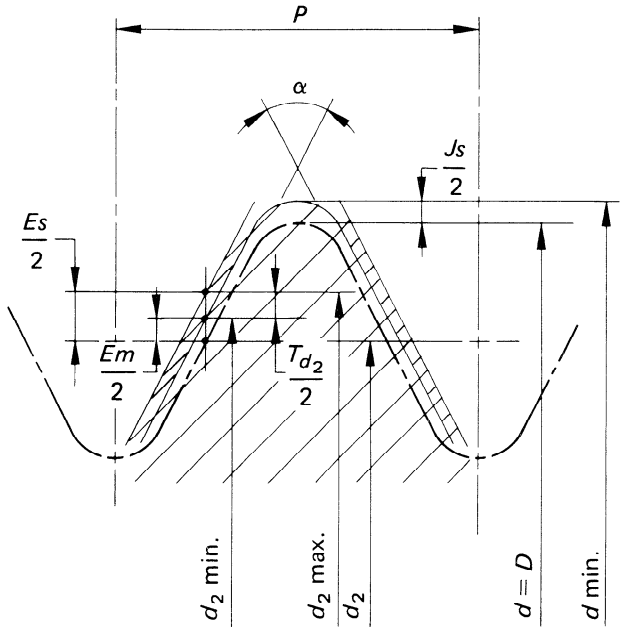

Figure 3 — G series

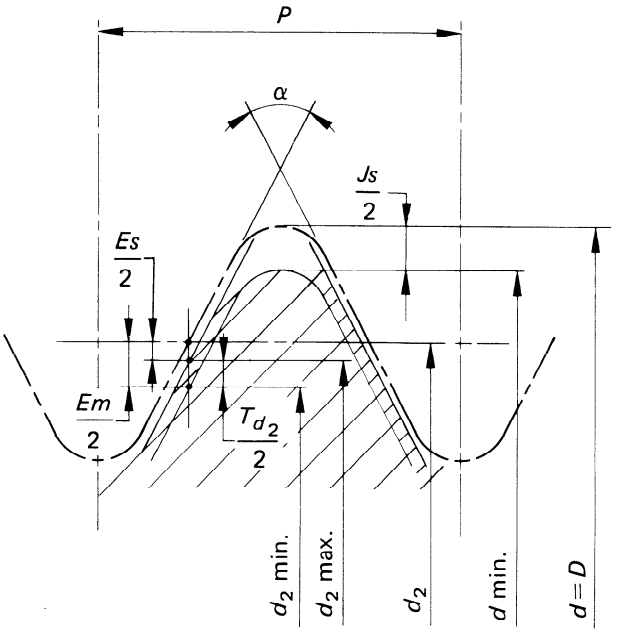

Figure 4 — Rp series

$d = D$ = basic major diameter
d min. = minimum permissible 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

3.2 Tolerance classes of taps

ISO 228/1 and ISO 7/1 each specify only one class of nut.

As a consequence, it is sufficient to have one class of taps for ISO 228/1 and another class of taps for ISO 7/1.

The tolerances of these taps are determined in terms of a tolerance unit t, the value of which is equal to the nut pitch diameter tolerance T_{D_2}.

3.3 Tolerances on pitch diameter

The minimum and maximum values of the tap pitch diameter are calculated so as to be greater than the minimum permissible value of the pitch diameter of the nut by amounts respectively equal to 0,2 times and 0,4 times the nut tolerance t.

3.3.1 Threads — G series (ISO 228/1)

The nut tolerance is a positive unilateral tolerance with zero lower deviation.

The lower deviation of the tap pitch diameter will then be $Em = + 0{,}2\ t$ and the upper deviation $Es = + 0{,}4\ t$ (see figure 5).

See the values of Em and Es in tables 1 and 2.

3.3.2 Threads — Rp series (ISO 7/1)

The nut tolerance is a bilateral equi-spaced tolerance.

The lower deviation of the tap pitch diameter will then be $Em = - 0{,}3\ t$ and the upper deviation $Es = - 0{,}1\ t$ (see figure 6).

See the values of Em and Es in tables 3 and 4.

3.4 Tolerances on major diameter

The minimum value of the tap major diameter is calculated so that it is greater than the minimum permissible value of the nut major diameter by an amount equal to a stated fraction of the tolerance t of the nut.

The upper deviation on the major diameter of the tap is not specified.

3.4.1 Threads — G series

The nut tolerance is a positive unilateral tolerance with zero lower deviation.

The lower deviation of the tap major diameter will be $Js = + 0{,}3\ t$ (i.e. tap diameter greater by 0,3 t than the nut minimum diameter).

See the values of Js in tables 1 and 2.

3.4.2 Threads — Rp series

The nut tolerance is a bilateral equi-spaced tolerance.

The lower deviation of the tap major diameter will be $Js = - 0{,}3\ t$ (i.e. tap diameter greater by 0,2 t than the nut minimum diameter).

See the values of Js in tables 3 and 4.

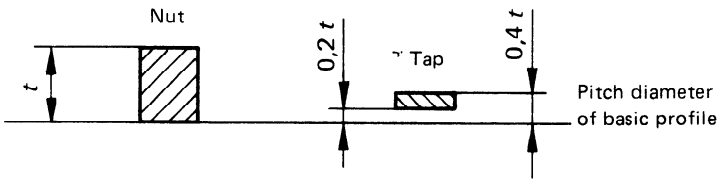

Figure 5 — Thread -- G series

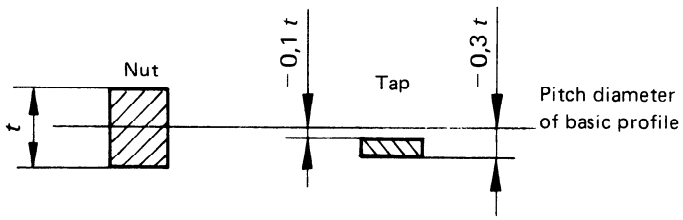

Figure 6 — Thread — Rp series

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

The tolerance is ± 30′ for all sizes.

4 Examples

Tables 5 and 6 show calculation examples of the dimensions of a tap G 1/2 and Rp 1/2 respectively.

Table 1 — Taps for pipe threads — G series — Dimensions in millimetres

Size designation	Basic major diameter d	Pitch	Major diameter		Basic pitch diameter d_2	Pitch diameter			
			Lower deviation $Js = +0{,}3\,t$	d min.		Lower deviation $Em = +0{,}2\,t$	d_2 min.	Upper deviation $Es = +0{,}4\,t$	d_2 max.
1/16	7,723	0,907	+ 0,032	7,755	7,142	+ 0,021	7,163	+ 0,043	7,185
1/8	9,728			9,760	9,147		9,168		9,190
1/4	13,157	1,337	+ 0,037	13,194	12,301	+ 0,025	12,326	+ 0,050	12,351
3/8	16,662			16,699	15,806		15,831		15,856
1/2	20,955	1,814	+ 0,043	20,998	19,793	+ 0,028	19,821	+ 0,057	19,850
5/8	22,911			22,954	21,749		21,777		21,806
3/4	26,441			26,484	25,279		25,307		25,336
7/8	30,201			30,244	29,039		29,067		29,096
1	33,249	2,309	+ 0,054	33,303	31,770	+ 0,036	31,806	+ 0,072	31,842
1 1/8	37,897			37,951	36,418		36,454		36,490
1 1/4	41,910			41,964	40,431		40,467		40,503
1 1/2	47,803			47,857	46,324		46,360		46,395
1 3/4	53,746			53,800	52,267		52,303		52,339
2	59,614			59,668	58,135		58,171		58,207
2 1/4	65,710		+ 0,065	65,775	64,231	+ 0,043	64,274	+ 0,087	64,318
2 1/2	75,184			75,249	73,705		73,748		73,792
2 3/4	81,534			81,599	80,055		80,098		80,142
3	87,884			87,949	86,405		86,448		86,492
3 1/2	100,330			100,395	98,851		98,894		98,938
4	113,030			113,095	111,551		111,594		111,638
4 1/2	125,730			125,795	124,251		124,294		124,338
5	138,430			138,495	136,951		136,994		137,038
5 1/2	151,130			151,195	149,651		149,694		149,738
6	163,830			163,895	162,351		162,394		162,438

Table 2 — **Taps for pipe threads — G series** — Dimensions in inches

Size designation	Basic major diameter d	Number of threads per inch	Major diameter		Basic pitch diameter d_2	Pitch diameter			
			Lower deviation $Js = +0{,}3\,t$	d min.		Lower deviation $Em = +0{,}2\,t$	d_2 min.	Upper deviation $Es = +0{,}4\,t$	d_2 max.
1/16	0.304 0	28	+ 0.001 3	0.305 3	0.281 1	+ 0.000 8	0.281 9	+ 0.001 7	0.282 8
1/8	0.383 0			0.384 3	0.360 1		0.360 9		0.361 8
1/4	0.518 0	19	+ 0.001 5	0.519 5	0.484 3	+ 0.001 0	0.485 3	+ 0.002 0	0.486 3
3/8	0.656 0			0.657 5	0.622 3		0.623 3		0.624 3
1/2	0.825 0	14	+ 0.001 7	0.826 7	0.779 3	+ 0.001 1	0.780 4	+ 0.002 2	0.781 5
5/8	0.902 0			0.903 7	0.856 3		0.857 4		0.858 5
3/4	1.041 0			1.042 7	0.995 3		0.996 4		0.997 5
7/8	1.189 0			1.190 7	1.143 3		1.144 4		1.145 5
1	1.309 0	11	+ 0.002 1	1.311 1	1.250 8	+ 0.001 4	1.252 2	+ 0.002 8	1.253 6
1 1/8	1.492 0			1.494 1	1.433 8		1.435 2		1.436 6
1 1/4	1.650 0			1.652 1	1.591 8		1.593 2		1.594 6
1 1/2	1.882 0			1.884 1	1.823 8		1.825 2		1.826 6
1 3/4	2.116 0			2.118 1	2.057 8		2.059 2		2.060 6
2	2.347 0			2.349 1	2.288 8		2.290 2		2.291 6
2 1/4	2.587 0		+ 0.002 6	2.589 6	2.528 8	+ 0.001 7	2.530 5	+ 0.003 4	2.532 2
2 1/2	2.960 0			2.962 6	2.901 8		2.903 5		2.905 2
2 3/4	3.210 0			3.212 6	3.151 8		3.153 5		3.155 2
3	3.460 0			3.462 6	3.401 8		3.403 5		3.405 2
3 1/2	3.950 0			3.952 6	3.891 8		3.893 5		3.895 2
4	4.450 0			4.452 6	4.391 8		4.393 5		4.395 2
4 1/2	4.950 0			4.952 6	4.891 8		4.893 5		4.895 2
5	5.450 0			5.452 6	5.391 8		5.393 5		5.395 2
5 1/2	5.950 0			5.952 6	5.891 8		5.893 5		5.895 2
6	6.450 0			6.452 6	6.391 8		6.393 5		6.395 2

Table 3 — Taps for pipe threads — Rp series — Dimensions in millimetres

Size designation	Basic major diameter d	Pitch	Major diameter		Basic pitch diameter d_2	Pitch diameter			
			Lower deviation $Js = -0{,}3\,t$	d min.		Lower deviation $Em = -0{,}3\,t$	d_2 min.	Upper deviation $Es = -0{,}1\,t$	d_2 max.
1/16	7,723	0,907	−0,043	7,680	7,142	−0,043	7,099	−0,014	7,128
1/8	9,728			9,865	9,147		9,104		9,133
1/4	13,157	1,337	−0,063	13,094	12,301	−0,063	12,238	−0,021	12,280
3/8	16,662			16,599	15,806		15,743		15,785
1/2	20,955	1,814	−0,086	20,869	19,793	−0,086	19,707	−0,029	19,764
3/4	26,441			26,355	25,279		25,193		25,250
1	33,249	2,309	−0,109	33,140	31,770	−0,109	31,661	−0,037	31,733
1 1/4	41,910			41,801	40,431		40,322		40,394
1 1/2	47,803			47,694	46,324		46,215		46,287
2	59,614			59,505	58,135		58,026		58,098
2 1/2	75,184		−0,130	75,054	73,705	−0,130	73,575	−0,043	73,662
3	87,884			87,754	86,405		86,275		86,362
4	113,030			112,900	111,551		111,421		111,508
5	138,430			138,300	136,951		136,821		136,908
6	163,830			163,700	162,351		162,221		162,308

Table 4 — Taps for pipe threads — Rp series — Dimensions in inches

Size designation	Basic major diameter d	Number of threads per inch	Major diameter		Basic pitch diameter d_2	Pitch diameter			
			Lower deviation $Js = -0{,}3\,t$	d min.		Lower deviation $Em = -0{,}3\,t$	d_2 min.	Upper deviation $Es = -0{,}1\,t$	d_2 max.
1/16	0.304 0	28	−0.001 7	0.302 3	0.281 2	−0.001 7	0.279 5	−0.000 6	0.280 6
1/8	0.383 0			0.381 3	0.360 1		0.358 4		0.359 5
1/4	0.518 0	19	−0.002 5	0.515 5	0.484 3	−0.002 5	0.481 8	−0.000 9	0.483 4
3/8	0.656 0			0.653 5	0.622 3		0.619 8		0.621 4
1/2	0.825 0	14	−0.003 4	0.821 6	0.779 3	−0.003 4	0.775 9	−0.001 2	0.778 1
3/4	1.041 0			1.037 6	0.995 3		0.991 9		0.994 1
1	1.309 0	11	−0.004 3	1.304 7	1.250 8	−0.004 3	1.246 5	−0.001 5	1.249 3
1 1/4	1.650 0			1.645 7	1.591 8		1.587 5		1.590 3
1 1/2	1.982 0			1.877 7	1.823 8		1.819 5		1.822 3
2	2.347 0			2.342 7	2.288 8		2.284 5		2.287 3
2 1/2	2.960 0		−0.005 1	2.954 9	2.901 8	−0.005 1	2.896 7	−0.001 7	2.900 1
3	3.460 0			3.454 9	3.401 8		3.396 7		3.400 1
4	4.450 0			4.444 9	4.391 8		4.386 7		4.390 1
5	5.450 0			5.444 9	5.391 8		5.386 7		5.390 1
6	6.450 0			6.444 9	6.391 8		6.386 7		6.390 1

Table 5 — Example : Calculation of the dimensions of the threaded portion of a G 1/2 ground thread tap

Tap designation	G 1/2
Tap characteristics	Basic major diameter = $d = D$ = 20,955 mm Pitch = 1,814 mm Thread length = 26 mm
Minimum major diameter	d min. = $d + Js = d + 0{,}3\,t$ d = 20,955 mm $Js = 0{,}3\,t$ = 0,043 mm d min. = 20,955 + 0,043 = 20,998 mm
Basic pitch diameter	$d_2 = D_2$ = 19,793 mm
Minimum pitch diameter	d_2 min. = $d_2 + Em = d_2 + 0{,}2\,t$ d_2 = 19,793 mm $Em = 0{,}2\,t$ = 0,028 mm d_2 min. = 19,793 + 0,028 = 19,821 mm
Maximum pitch diameter	d_2 max. = $d_2 + Es = d_2 = 0{,}4\,t$ d_2 = 19,793 mm $Es = 0{,}4\,t$ = 0,057 mm d_2 max. = 19,793 + 0,057 = 19,850 mm
Minor diameter	Not specified
Tolerance on angle α and half-angle $\alpha/2$	± 30′
Cumulative pitch error, T_P, over any number of threads	As in ISO 2857

Table 6 — Example : Calculation of the dimensions of the threaded portion of an Rp 1/2 ground thread tap

Tap designation	Rp 1/2
Tap characteristics	Basic major diameter $d = D$ = 20,955 mm Pitch = 1,814 mm Thread length = 26 mm
Minimum major diameter	d min. = $d - Js = d - 0{,}3\,t$ d = 20,955 mm $Js = 0{,}3\,t$ = 0,086 mm d min. = 20,955 − 0,086 = 20,869 mm
Basic pitch diameter	$d_2 = D_2$ = 19,793 mm
Minimum pitch diameter	d_2 min. = $d_2 - Em = d_2 - 0{,}3\,t$ d_2 = 19,793 mm $Em = 0{,}3\,t$ = 0,086 mm d_2 min. = 19,793 − 0,086 = 19,707 mm
Maximum pitch diameter	d_2 max. = $d_2 - Es = d_2 - 0{,}1\,t$ d_2 = 19,793 mm $Es = 0{,}1\,t$ = 0,029 mm d_2 max. = 19,793 − 0,029 = 19,764 mm
Minor diameter	Not specified
Tolerance on angle α and half-angle $\alpha/2$	± 30′
Cumulative pitch error, T_P, over any number of threads	As in ISO 2857

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