FLEXIBLE MEASURING SYSTEMS

ISO Trapezoidal screw threads Tr

FMS

WWW.F-M-S.DK

NOMINAL PITCH DIAMETER d_2 & D_2

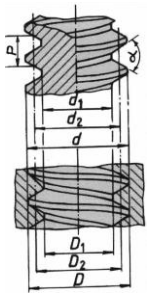
$$d_2/D_2 = d/D - PDn \qquad (PDn = 0.5P)$$

EXTERNAL THREAD

d = major diameter

d_2 = Pitch diameter

d_1 = Minor diameter



INTERNAL THREAD

D = Major diameter

D_2 = Pitch diameter

D_1 = Minor diameter

P = Pitch

α = Flank angle 30°

Ref.: ISO 2901 *ISO metric trapezoidal screw threads – Basic profile and maximum material profiles.*
ISO 2902 *ISO metric trapezoidal screw threads – general plan*
ISO 2903 *ISO metric trapezoidal screw threads – Tolerances*
ISO 2904 *ISO metric trapezoidal screw threads – basic dimensions*
These standards contain much more information than given here.

Diameters and pitch combinations

Nominal diameter			Pitch P		
column 1	column 2	column 3	course	**normal**	fine
8				**1,5**	
	9			**2**	1,5
10				**2**	1,5
	11		3	**2**	2
12				**3**	2
	14			**3**	2
16				**4**	2
	18			**4**	2
20				**4**	2
	22		8	**5**	3
24			8	**5**	3
	26		8	**5**	3
28			8	**5**	3
	30		10	**6**	3
32			10	**6**	3
	34		10	**6**	3
36			10	**6**	3
	38		10	**7**	3
40			10	**7**	3
	42		10	**7**	3
44			12	**7**	3
	46		12	**8**	3
48			12	**8**	3
	50		12	**8**	3
52			12	**8**	3
	55		14	**9**	3
60			14	**9**	3
	65		16	**10**	4
70			16	**10**	4
	75		16	**10**	4
80			16	**10**	4
	85		18	**12**	4
90			18	**12**	4
	95		18	**12**	4
100			20	**12**	4
		105	20	**12**	4

Nominal diameter			Pitch P		
column 1	column 2	column 3	course	**normal**	fine
	110		20	**12**	4
		115	22	**14**	6
120			22	**14**	6
		125	22	**14**	6
	130		22	**14**	6
		135	24	**14**	6
140			24	**14**	6
		145	24	**14**	6
	150		24	**16**	6
		155	24	**16**	6
160			28	**16**	6
		165	28	**16**	6
	170		28	**16**	6
		175	28	**16**	8
180			28	**18**	8
		185	32	**18**	8
	190		32	**18**	8
		195	32	**18**	8
200			32	**18**	8
	210		36	**20**	8
220			36	**20**	8
	230		36	**20**	8
240			36	**22**	8
	250		40	**22**	12
260			40	**22**	12
	270		40	**24**	12
280			40	**24**	12
	290		44	**24**	12
300			44	**24**	12

Diameters in column 1should have preference over column 2, and column 2 should have preference over column 3. Diameters from column 3 should be avoided in new designs.

"Normal" pitch should be chosen when possible.

Nominal pitch diameters

Nominal diameter			Pitch	Pitch diameter
column 1	column 2	column 3	P	$d_2 = D_2$
8			1,5	7,250
	9		1,5	8,250
			2	8,000
10			2	9,250
			3	9,000
	11		2	10,000
			3	9,500
12			2	11,000
			3	10,500
	14		2	13,000
			4	12,500
16			2	15,000
			4	16,000
	18		2	17,000
			4	16,000
20			2	19,000
			4	18,000
	22		3	20,500
			5	19,500
			8	18,000
24			3	22,500
			5	21,500
			8	20,000
	26		3	24,500
			5	23,500
			8	22,000
28			3	26,500
			6	25,500
			10	24,000
	30		3	28,500
			6	27,500
			10	25,000
32			3	30,500
			6	29,000
			10	27,000
	34		3	32,500
			6	31,000
			10	29,000
36			3	34,500
			6	33,000
			10	31,000
	38		3	36,500
			7	34,500
			10	33,000
40			3	38,500
			7	36,500
			10	35,000
	42		3	40,500
			7	38,500
			10	37,000
44			3	42,500
			7	40,500
			12	38,000
	46		3	44,500
			8	42,000
			12	40,000
48			3	46,500
			8	44,000
			12	42,000
	50		3	48,500
			8	46,000
			12	44,000
52			3	50,500
			8	48,000
			12	46,000
	55		3	53,500
			9	50,500
			14	48,000
60			3	58,500
			9	55,500
			14	53,000

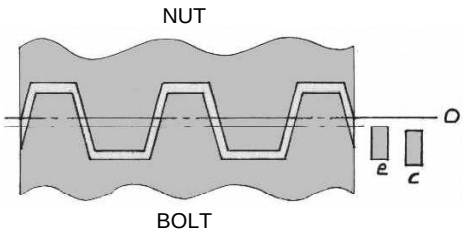
Nominal diameter			Pitch	Pitch diameter
column 1	column 2	column 3	P	$d_2 = D_2$
	65		4	63,000
			10	60,000
			16	57,000
70			4	68,000
			10	65,000
			16	62,000
	75		4	73,000
			10	70,000
			16	67,000
80			4	78,000
			10	75,000
			16	72,000
	85		4	83,000
			12	79,000
			18	76,000
90			4	88,000
			12	84,000
			18	81,000
	95		4	93,000
			12	89,000
			18	86,000
100			4	98,000
			12	94,000
			20	90,000
		105	4	103,000
			12	99,000
			20	95,000
	110		4	108,000
			12	104,000
			20	100,000
		115	6	112,000
			12	108,000
			22	104,000
120			6	117,000
			12	113,000
			22	109,000
		125	6	122,000
			14	118,000
			22	114,000
	130		6	127,000
			14	123,000
			22	119,000
		135	6	132,000
			14	128,000
			24	123,000
140			6	137,000
			14	133,000
			24	128,000
		145	6	142,000
			14	138,000
			24	133,000
	150		6	147,000
			16	142,000
			24	138,000
		155	6	152,000
			16	147,000
			24	143,000
160			6	157,000
			16	152,000
			28	146,000
		165	6	162,000
			16	157,000
			28	151,000
	170		6	167,000
			16	162,000
			28	156,000
		175	6	171,000
			16	167,000
			28	161,000
180			8	176,000
			18	171,000
			28	166,000

Nominal diameter			Pitch P	Pitch diameter $d_2 = D_2$
column 1	column 2	column 3		
		185	8	181,000
			18	176,000
			32	169,000
	190		8	186,000
			18	181,000
			32	174,000
		195	8	191,000
			18	186,000
			32	179,000
200			8	196,000
			18	191,000
			32	184,000
	210		8	206,000
			20	200,000
			36	192,000
220			8	216,000
			20	210,000
			36	202,000
	230		8	226,000
			20	220,000
			36	212,000

Nominal diameter			Pitch P	Pitch diameter $d_2 = D_2$
column 1	column 2	column 3		
240			8	236,000
			22	229,000
			36	222,000
	250		12	244,000
			22	239,000
			40	230,000
260			12	254,000
			22	249,000
			40	240,000
	270		12	264,000
			24	258,000
			40	250,000
280			12	274,000
			22	268,000
			40	260,000
	290		12	284,000
			22	278,000
			44	268,000
300			12	294,000
			22	288,000
			44	278,000

Basic allowance for pitch diameters for internal (Nut) and external (Bolt) threads

Pitch P	Basic allowance		
	Internal thread D_2	External thread d_2 **c**	**e**
1,5	0	- 0,140	- 0,067
2	0	- 0,150	- 0,071
3	0	- 0,170	- 0,085
4	0	- 0,190	- 0,095
5	0	- 0,212	- 0,106
6	0	- 0,236	- 0,118
7	0	- 0,250	- 0,125
8	0	- 0,265	- 0,132
9	0	- 0,280	- 0,140
10	0	- 0,300	- 0,150
12	0	- 0,335	- 0,160
14	0	- 0,355	- 0,180
16	0	- 0,375	- 0,190
18	0	- 0,400	- 0,200
20	0	- 0,425	- 0,212
22	0	- 0,450	- 0,224
24	0	- 0,475	- 0,236
26	0	- 0,500	- 0,250
32	0	- 0,530	- 0,265
36	0	- 0,560	- 0,280
40	0	- 0,600	- 0,300
44	0	-0,630	-0,315



Tolerances for pitch diameter

Nominal diameter mm		Pitch P	Tolerance class Internal thread			Tolerance class External thread			
above	Up to		7	8	9	6	7	8	9
5,6	11,2	1,5	0,224	0,280	0,355	0,132	0,170	0,212	0,265
		2	0,250	0,315	0,400	0,150	0,190	0,236	0,300
		3	0,280	0,355	0,450	0,170	0,212	0,265	0,335
11,2	22,4	2	0,265	0,355	0,425	0,160	0,200	0,250	0,315
		3	0,300	0,375	0,475	0,180	0,224	0,280	0,355
		4	0,355	0,450	0,560	0,212	0,265	0,335	0,425
		5	0,375	0,475	0,600	0,224	0,280	0,355	0,450
		8	0,475	0,600	0,750	0,280	0,355	0,450	0,560
22,4	45	3	0,335	0,425	0,530	0,200	0,250	0,315	0,400
		5	0,400	0,500	0,630	0,236	0,300	0,375	0,475
		6	0,450	0,560	0,710	0,265	0,335	0,425	0,530
		7	0,475	0,600	0,750	0,280	0,355	0,450	0,560
		8	0,500	0,630	0,800	0,300	0,375	0,475	0,600
		10	0,530	0,670	0,850	0,315	0,400	0,500	0,630
		12	0,560	0,710	0,900	0,335	0,425	0,530	0,670
45	90	3	0,355	0,450	0,560	0,212	0,265	0,335	0,425
		4	0,400	0,500	0,630	0,236	0,300	0,375	0,475
		8	0,530	0,670	0,850	0,315	0,400	0,500	0,630
		9	0,560	0,710	0,900	0,335	0,425	0,530	0,670
		10	0,560	0,710	0,900	0,335	0,425	0,530	0,670
		12	0,630	0,800	1,000	0,375	0,475	0,600	0,750
		14	0,670	0,850	1,060	0,400	0,500	0,630	0,800
		16	0,710	0,900	1,120	0,425	0,530	0,670	0,850
		18	0,750	0,950	1,180	0,450	0,560	0,710	0,900
90	180	4	0,425	0,530	0,670	0,250	0,315	0,400	0,500
		6	0,500	0,630	0,800	0,300	0,375	0,475	0,600
		8	0,560	0,710	0,900	0,335	0,425	0,530	0,670
		12	0,670	0,850	1,060	0,400	0,500	0,630	0,800
		14	0,710	0,900	1,120	0,425	0,530	0,670	0,850
		16	0,750	0,950	1,180	0,450	0,560	0,710	0,900
		18	0,800	1,000	1,250	0,475	0,600	0,750	0,950
		20	0,800	1,000	1,250	0,475	0,600	0,750	0,950
		22	0,850	1,060	1,320	0,500	0,630	0,800	1,000
		24	0,900	1,120	1,400	0,530	0,670	0,850	1,060
		28	0,950	1,180	1,500	0,560	0,710	0,900	1,120
180	355	8	0,600	0,750	0,950	0,355	0,450	0,560	0,710
		12	0,710	0,900	1,120	0,425	0,530	0,670	0,850
		18	0,850	1,060	1,320	0,500	0,630	0,800	1,000
		20	0,900	1,120	1,400	0,530	0,670	0,850	1,060
		22	0,900	1,120	1,400	0,530	0,670	0,850	1,060
		24	0,950	1,180	1,500	0,560	0,710	0,900	1,120
		32	1,060	1,320	1,700	0,630	0,800	1,000	1,250
		36	1,120	1,400	1,800	0,670	0,850	1,060	1,320
		40	1,120	1,400	1,800	0,670	0,850	1,060	1,320
		44	1,250	1,500	1,900	0,710	0,900	1,120	1,400

Examples

Denomination	Nut	Pitch diameter D_2	Tolerance	max	min
Tr 40 x 7 – 7H		**36,500**	**- 0 / + 0,475**	**36,975**	**36,500**

Denomination	Bolt	Pitch diameter d_2	Tolerance	max	min
Tr 40 x 7 – 7e		**36,500**	**- 0,125 / - 0,480**	**36,375**	**36,020**