International Standard 235

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Parallel shank jobber and stub series drills and Morse taper shank drills

Forets à queue cylindrique courts et extra-courts et forets à queue cône Morse

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Descriptors : tools, twist drills, shanks, parallel shanks, Morse taper shanks, dimensions.

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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 235 was developed by Technical Committee ISO/TC 29, *Small tools*. The first edition (ISO 235/1-1975) had been approved by the member bodies of the following countries :

Austria	India	Romania
Belgium	Italy	Sweden
Czechoslovakia	Mexico	Switzerland
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Germany, F. R.	Pakistan	USSR
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The member bodies of the following countries expressed disapproval of the document on technical grounds :

Canada
USA

This second edition, which superseded ISO 235/1-1975, incorporates draft Amendment 1, which was circulated to the member bodies in August 1978, and which has been approved by the member bodies of the following countries :

Australia	Israel	Spain
Austria	Italy	Sweden
Belgium	Japan	Switzerland
Chile	Korea, Dem. P. Rep. of	United Kingdom
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Hungary	Romania	
India	South Africa, Rep. of	

The member body of the following country expressed disapproval of the document on technical grounds :

Germany, F. R.

Printed in Switzerland

Parallel shank jobber and stub series drills and Morse taper shank drills

1 Scope and field of application

This International Standard lays down the dimensions of the following three types of drills :

1) parallel shank drills, stub series;

2) parallel shank drills, jobber series;

3) Morse taper shank drills.

It comprises, for each type of drill mentioned above, three tables giving respectively :

a) the dimensions in millimetres;

b) the dimensions in inches;

c) the corresponding lengths, in millimetres and in inches, set out as functions of diameter steps.

2 Interchangeability

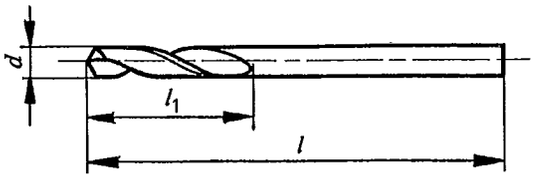
The numerical tables have been drawn up in such a way as to ensure that the standard dimensions in millimetres and inches correspond as closely as possible.

To this end, the complete range of diameters has been subdivided into a number of steps, the limits of which have been derived from the preferred number series for the metric values and converted directly from those for the inch values; the lengths and taper shank dimensions remain the same for the metric and the inch values within a given step.

The recommended diameters in the two systems of units of measurement differ, however, and the number of recommended diameters, in a given step, also differs in one system from that in the other.

Finally, the tolerance on the diameter of the cutting portion has been standardized solely on the basis of the metric values of h8, converted directly into inches for inch drills.

3 Parallel shank twist drills, stub series



3.1 Dimensions in millimetres

d	l_1	l	d	l_1	l	d	l_1	l	d	l_1	l
0,50	3	20	9,50	40	84	18,50	64	127	27,50	81	162
0,80	5	24	9,80	43	89	18,75			27,75		
1,00	6	26	10,00			19,00			28,00		
1,20	8	30	10,20			19,25	66	131	28,25	84	168
1,50	9	32	10,50			19,50			28,50		
1,80	11	36	10,80	47	95	19,75			28,75		
2,00	12	38	11,00			20,00			29,00		
2,20	13	40	11,20			20,25	68	136	29,25		
2,50	14	43	11,50			20,50			29,50		
2,80	16	46	11,80			20,75			29,75		
3,00			12,00	51	102	21,00			30,00		
3,20	18	49	12,20			21,25	70	141	30,25	87	174
3,50	20	52	12,50			21,50			30,50		
3,80	22	55	12,80			21,75			30,75		
4,00			13,00			22,00			31,00		
4,20			13,20			22,25			31,25		
4,50	24	58	13,50	54	107	22,50	72	146	31,50	90	180
4,80	26	62	13,80			22,75			31,75		
5,00			14,00			23,00			32,00		
5,20			14,25	56	111	23,25			32,50		
5,50	28	66	14,50			23,50			33,00		
5,80			14,75			23,75	75	151	33,50	93	186
6,00			15,00			24,00			34,00		
6,20	31	70	15,25	58	115	24,25			34,50		
6,50			15,50			24,50			35,00		
6,80	34	74	15,75			24,75			35,50		
7,00			16,00			25,00			36,00	96	193
7,20			16,25	60	119	25,25	78	156	36,50		
7,50			16,50			25,50			37,00		
7,80	37	79	16,75			25,75			37,50		
8,00			17,00			26,00			38,00	100	200
8,20			17,25	62	123	26,25			38,50		
8,50			17,50			26,50			39,00		
8,80	40	84	17,75			26,75	81	162	39,50		
9,00			18,00			27,00			40,00		
9,20			18,25	64	127	27,25					

3.2 Dimensions in inches

d	l_1	l	d	l_1	l	d	l_1	l
1/32	3/16	15/16	17/32	2 1/8	4 7/32	1 1/32	3 1/16	6 1/8
3/64	5/16	1 3/16	35/64			1 3/64	3 3/16	6 3/8
1/16	13/32	1 11/32	9/16	2 7/32	4 3/8	1 1/16		
5/64	15/32	1 1/2	37/64			1 5/64		
3/32	9/16	1 11/16	19/32			1 3/32		
7/64	5/8	1 13/16	39/64	2 9/32	4 17/32	1 7/64		
1/8	11/16	1 15/16	5/8			1 1/8	3 5/16	6 5/8
9/64	25/32	2 1/16	41/64	2 3/8	4 11/16	1 9/64		
5/32	7/8	2 5/32	21/32			1 5/32		
11/64	15/16	2 9/32	43/64			1 11/64		
3/16	1 1/32	2 7/16	11/16	2 7/16	4 27/32	1 3/16		
13/64			45/64			1 13/64	3 7/16	6 27/32
7/32	1 1/8	2 19/32	23/32	2 1/2	5	1 7/32		
15/64			47/64			1 15/64		
1/4	1 7/32	2 3/4	3/4			1 1/4		
17/64	1 5/16	2 29/32	49/64	2 19/32	5 5/32	1 17/64		
9/32			25/32			1 9/32	3 17/32	7 3/32
19/64			51/64			1 19/64		
5/16	1 7/16	3 1/8	13/16	2 11/16	5 11/32	1 5/16		
21/64			53/64			1 21/64		
11/32	1 9/16	3 5/16	27/32			1 11/32		
23/64			55/64	2 3/4	5 9/16	1 23/64	3 21/32	7 5/16
3/8			7/8			1 3/8		
25/64	1 11/16	3 1/2	57/64			1 25/64		
13/32			29/32	2 27/32	5 3/4	1 13/32		
27/64			59/64			1 27/64		
7/16	1 27/32	3 3/4	15/16			1 7/16	3 25/32	7 19/32
29/64			61/64	2 15/16	5 15/16	1 29/64		
15/32			31/32			1 15/32		
31/64	2	4	63/64			1 31/64	3 15/16	7 7/8
1/2			1	3 1/16	6 1/8	1 1/2		
33/64			1 1/64					

NOTES relating to the tables in 3.1 and 3.2.

1 **Intermediate sizes**

When intermediate sizes are needed, reference should be made to the general table in 3.3 for the corresponding lengths.

2 **Cutting portion**

— Tolerance on diameter d measured near the point : h8.

For dimensions in inches, direct conversion into inches of the metric values of the tolerance h8.

— Back taper : at the manufacturer's discretion.

— Hand of cutting, unless otherwise specified : right.

3 **Shank**

These drills are normally made without driving tenon.

4 **Tolerance on lengths**

See general table in 3.3.

3.3 General table : Corresponding lengths, in millimetres and in inches, set out as functions of diameter steps

Diameter ranges d				Corresponding lengths			
over	incl.	over	incl.	l_1	l	l_1	l
mm		in		mm		in	
0,19	0,24	0.007 5	0.009 4	1,5	19	1/16	3/4
0,24	0,30	0.009 4	0.011 8				
0,30	0,38	0.011 8	0.015 0	2,0		3/32	
0,38	0,48	0.015 0	0.018 9	2,5		3/32	
0,48	0,53	0.018 9	0.020 9	3,0	20	1/8	25/32
0,53	0,60	0.020 9	0.023 6	3,5	21	1/8	13/16
0,60	0,67	0.023 6	0.026 4	4,0	22	5/32	7/8
0,67	0,75	0.026 4	0.029 5	4,5	23	3/16	29/32
0,75	0,85	0.029 5	0.033 5	5,0	24	3/16	15/16
0,85	0,95	0.033 5	0.037 4	5,5	25	7/32	31/32
0,95	1,06	0.037 4	0.041 7	6,0	26	1/4	1 1/32
1,06	1,18	0.041 7	0.046 4	7,0	28	9/32	1 3/32
1,18	1,32	0.046 4	0.052 0	8,0	30	5/16	1 3/16
1,32	1,50	0.052 0	0.059 1	9,0	32	11/32	1 1/4
1,50	1,70	0.059 1	0.066 9	10	34	13/32	1 11/32
1,70	1,90	0.066 9	0.074 8	11	36	7/16	1 7/16
1,90	2,12	0.074 8	0.083 5	12	38	15/32	1 1/2
2,12	2,36	0.083 5	0.092 9	13	40	1/2	1 9/16
2,36	2,65	0.092 9	0.104 3	14	43	9/16	1 11/16
2,65	3,00	0.104 3	0.118 1	16	46	5/8	1 13/16
3,00	3,35	0.118 1	0.131 9	18	49	11/16	1 15/16
3,35	3,75	0.131 9	0.147 6	20	52	25/32	1 1/16
3,75	4,25	0.147 6	0.167 3	22	55	7/8	2 5/32
4,25	4,75	0.167 3	0.187 0	24	58	15/16	2 9/32
4,75	5,30	0.187 0	0.208 7	26	62	1 1/32	2 7/16
5,30	6,00	0.208 7	0.236 2	28	66	1 1/8	2 19/32
6,00	6,70	0.236 2	0.263 8	31	70	1 7/32	2 3/4
6,70	7,50	0.263 8	0.295 3	34	74	1 5/16	2 29/32
7,50	8,50	0.295 3	0.334 6	37	79	1 7/16	3 1/8
8,50	9,50	0.334 6	0.374 0	40	84	1 9/16	3 5/16
9,50	10,60	0.374 0	0.417 3	43	89	1 11/16	3 1/2
10,60	11,80	0.417 3	0.464 6	47	95	1 27/32	3 3/4
11,80	13,20	0.464 6	0.519 7	51	102	2	4
13,20	14,00	0.519 7	0.551 2	54	107	2 1/8	4 7/32
14,00	15,00	0.551 2	0.590 6	56	111	2 7/32	4 3/8
15,00	16,00	0.590 6	0.629 9	58	115	2 9/32	4 17/32
16,00	17,00	0.629 9	0.669 3	60	119	2 3/8	4 11/16
17,00	18,00	0.669 3	0.708 7	62	123	2 7/16	4 27/32
18,00	19,00	0.708 7	0.748 0	64	127	2 1/2	5
19,00	20,00	0.748 0	0.787 4	66	131	2 19/32	5 5/32
20,00	21,20	0.787 4	0.834 6	68	136	2 11/16	5 11/32
21,20	22,40	0.834 6	0.881 9	70	141	2 3/4	5 9/16
22,40	23,60	0.881 9	0.929 1	72	146	2 27/32	5 3/4
23,60	25,00	0.929 1	0.984 2	75	151	2 15/16	5 15/16
25,00	26,50	0.984 2	1.043 3	78	156	3 1/16	6 1/8
26,50	28,00	1.043 3	1.102 4	81	162	3 3/16	6 3/8
28,00	30,00	1.102 4	1.181 1	84	168	3 5/16	6 5/8
30,00	31,50	1.181 1	1.240 2	87	174	3 7/16	6 27/32
31,50	33,50	1.240 2	1.318 9	90	180	3 17/32	7 3/32
33,50	35,50	1.318 9	1.397 6	93	186	3 21/32	7 5/16
35,50	37,50	1.397 6	1.476 6	96	193	3 25/32	7 19/32
37,50	40,00	1.476 4	1.574 8	100	200	3 15/16	7 7/8

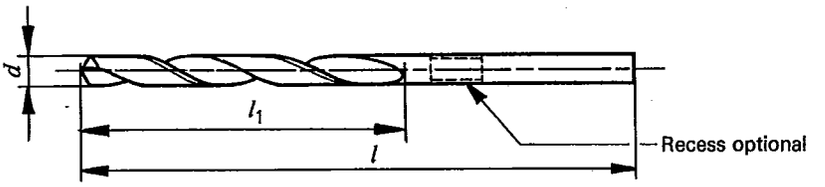
NOTES

1 **Tolerance on lengths**

Lengths l and l_1 may vary, within one diameter step, between the minimum and maximum limits corresponding respectively to the figures given for the nearest lower or upper step. (See as examples the note under 4.3 and 5.3.)

2 **Standardized diameters** in millimetres and in inches : see the tables in 3.1 and 3.2.

4 Parallel shank twist drills, jobber series



4.1 Dimensions in millimetres

d	l_1	l	d	l_1	l	d	l_1	l	d	l_1	l	d	l_1	l
0,20	2,5	30	1,40	18	40	3,80	43	75	7,80	75	117	11,80	94	142
0,22			1,45			3,90			7,90			11,90	101	151
0,25	3		1,50			4,00			8,00			12,00		
0,28			1,55	20	43	4,10			8,10			12,10		
0,30			1,60			4,20			8,20			12,20		
0,32	4		1,65			4,30	47	80	8,30			12,30		
0,35			1,70			4,40			8,40			12,40		
0,38			1,75	22	46	4,50			8,50			12,50		
0,40	5	20	1,80			4,60			8,60	81	125	12,60		
0,42			1,85			4,70			8,70			12,70		
0,45			1,90			4,80	52	86	8,80			12,80		
0,48			1,95	24	49	4,90			8,90			12,90		
0,50	6	22	2,00			5,00			9,00			13,00		
0,52			2,05			5,10			9,10			13,10		
0,55	7	24	2,10			5,20			9,20			13,20		
0,58			2,15	27	53	5,30			9,30			13,30	108	160
0,60			2,20			5,40	57	93	9,40			13,40		
0,62	8	26	2,25			5,50			9,50			13,50		
0,65			2,30			5,60			9,60	87	133	13,60		
0,68	9	28	2,35			5,70			9,70			13,70		
0,70			2,40	30	57	5,80			9,80			13,80		
0,72			2,45			5,90			9,90			13,90		
0,75			2,50			6,00			10,00			14,00		
0,78	10	30	2,55			6,10	63	101	10,10			14,25	114	169
0,80			2,60			6,20			10,20			14,50		
0,82			2,65			6,30			10,30			14,75		
0,85			2,70	33	61	6,40			10,40			15,00		
0,88	11	32	2,75			6,50			10,50			15,25	120	178
0,90			2,80			6,60			10,60			15,50		
0,92			2,85			6,70			10,70	94	142	15,75		
0,95			2,90			6,80	69	109	10,80			16,00		
0,98	12	34	2,95			6,90			10,90			16,50	125	184
1,00			3,00			7,00			11,00			17,00		
1,05			3,10	36	65	7,10			11,10			17,50	130	191
1,10	14	36	3,20			7,20			11,20			18,00		
1,15			3,30			7,30			11,30			18,50	135	198
1,20	16	38	3,40	39	70	7,40			11,40			19,00		
1,25			3,50			7,50			11,50			19,50	140	205
1,30			3,60			7,60	75	117	11,60			20,00		
1,35	18	40	3,70			7,70			11,70					

4.2 Dimensions in inches

d	l_1	l
1/64	3/16	13/16
1/32	13/32	1 3/16
3/64	5/8	1 1/2
1/16	25/32	1 11/16
5/64	15/16	1 15/16
3/32	1 3/16	2 1/4
7/64	1 5/16	2 13/32
1/8	1 7/16	2 9/16
9/64	1 17/32	2 3/4
5/32	1 11/16	2 15/16
11/64	1 27/32	3 5/32
3/16	2 1/16	3 3/8
13/64		
7/32	2 1/4	3 21/32
15/64		
1/4	2 1/2	3 31/32
17/64	2 23/32	4 9/32
9/32		
19/64	2 15/16	4 19/32
5/16		
21/64		
11/32	3 3/16	4 29/32
23/64		
3/8	3 7/16	5 1/4
25/64		
13/32		
27/64	3 11/16	5 19/32
7/16		
29/64		
15/32	3 31/32	5 15/16
31/64		
1/2		

NOTES relating to the tables in 4.1 and 4.2.

1 **Intermediate sizes**

When intermediate sizes are needed, reference should be made to the general table in 4.3 for the corresponding lengths.

2 **Cutting portion**

— Tolerance on diameter d measured near the point : h8.

For dimensions in inches, direct conversion into inches of the the metric values of the tolerance h8.

— Back taper : at the manufacturer's discretion.

— Hand of cutting, unless otherwise specified : right.

3 **Shank**

These drills are normally made without driving tenon.

4 **Tolerance on lengths**

See general table in 4.3.

4.3 General table : Corresponding lengths, in millimetres and in inches, set out as functions of diameter steps

Diameter ranges d				Corresponding lengths			
over	incl.	over	incl.	l_1	l	l_1	l
mm		in		mm		in	
0,19	0,24	0.007 5	0.009 4	2,5		3/32	
0,24	0,30	0.009 4	0.011 8	3	19	1/8	3/4
0,30	0,38	0.011 8	0.015 0	4		5/32	
0,38	0,48	0.015 0	0.018 9	5	20	3/16	13/16
0,48	0,53	0.018 9	0.020 9	6	22	1/4	7/8
0,53	0,60	0.020 9	0.023 6	7	24	9/32	15/16
0,60	0,67	0.023 6	0.026 4	8	26	5/16	1
0,67	0,75	0.026 4	0.029 5	9	28	11/32	1 1/8
0,75	0,85	0.029 5	0.033 5	10	30	13/32	1 3/16
0,85	0,95	0.033 5	0.037 4	11	32	7/16	1 1/4
0,95	1,06	0.037 4	0.041 7	12	34	15/32	1 5/16
1,06	1,18	0.041 7	0.046 4	14	36	9/16	1 7/16
1,18	1,32	0.046 4	0.052 0	16	38	5/8	1 1/2
1,32	1,50	0.052 0	0.059 1	18	40	11/16	1 9/16
1,50	1,70	0.059 1	0.066 9	20	43	25/32	1 11/16
1,70	1,90	0.066 9	0.074 8	22	46	7/8	1 13/16
1,90	2,12	0.074 8	0.083 5	24	49	15/16	1 15/16
2,12	2,36	0.083 5	0.092 9	27	53	1 1/16	2 3/32
2,36	2,65	0.092 9	0.104 3	30	57	1 3/16	2 1/4
2,65	3,00	0.104 3	0.118 1	33	61	1 5/16	2 13/32
3,00	3,35	0.118 1	0.131 9	36	65	1 7/16	2 9/16
3,35	3,75	0.131 9	0.147 6	39	70	1 17/32	2 3/4
3,75	4,25	0.147 6	0.167 3	43	75	1 11/16	2 15/16
4,25	4,75	0.167 3	0.187 0	47	80	1 27/32	3 5/32
4,75	5,30	0.187 0	0.208 7	52	86	2 1/16	3 3/8
5,30	6,00	0.208 7	0.236 2	57	93	2 1/4	3 21/32
6,00	6,70	0.236 2	0.263 8	63	101	2 1/2	3 31/32
6,70	7,50	0.263 8	0.295 3	69	109	2 23/32	4 9/32
7,50	8,50	0.295 3	0.334 6	75	117	2 15/16	4 19/32
8,50	9,50	0.334 6	0.374 0	81	125	3 3/16	4 29/32
9,50	10,60	0.374 0	0.417 3	87	133	3 7/16	5 1/4
10,60	11,80	0.417 3	0.464 6	94	142	3 11/16	5 19/32
11,80	13,20	0.464 6	0.519 7	101	151	3 31/32	5 15/16
13,20	14,00	0.519 7	0.551 2	108	160	4 1/4	6 5/16
14,00	15,00	0.551 2	0.590 6	114	169	4 1/2	6 5/8
15,00	16,00	0.590 6	0.629 9	120	178	4 3/4	7
16,00	17,00	0.629 9	0.669 3	125	184	4 7/8	7 1/4
17,00	18,00	0.669 3	0.708 7	130	191	5 1/8	7 1/2
18,00	19,00	0.708 7	0.748 0	135	198	5 1/4	7 13/16
19,00	20,00	0.748 0	0.787 4	140	205	5 1/2	8 1/16

NOTES

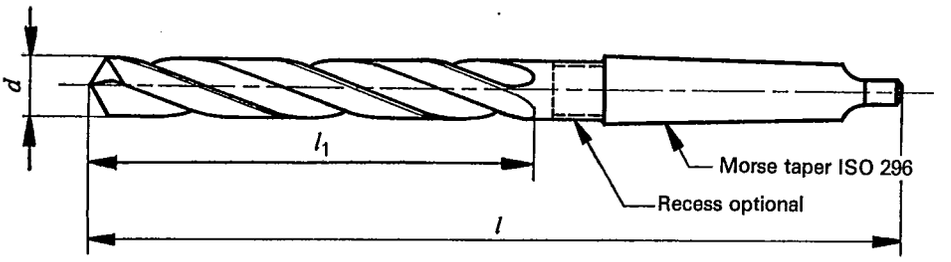
1 **Tolerance on lengths**

Lengths l and l_1 may vary, within one diameter step, between the minimum and maximum limits corresponding respectively to the figures given for the nearest lower or upper step.

Example : For the diameter 4 mm, length l_1 may vary between 39 and 47 from the nominal value 43 mm, and length l may vary between 70 and 80 from the nominal value 75 mm.

2 **Standardized diameters** in millimetres and in inches : see the tables in 4.1 and 4.2.

5 Morse taper shank twist drills



5.1 Dimensions in millimetres

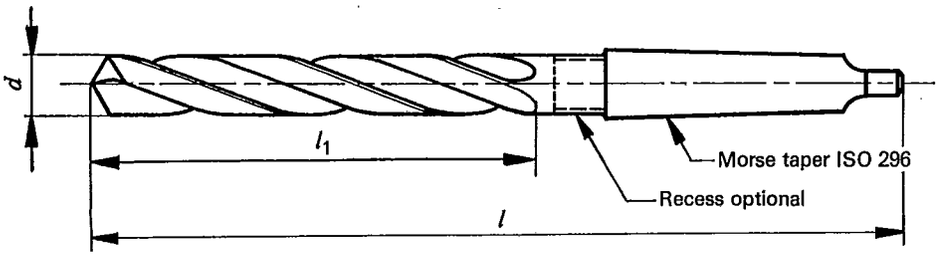
d	l_1	Standard shank		Oversize shank		d	l_1	Standard shank		Oversize shank		d	l_1	Standard shank		Oversize shank	
		l	M.T.	l	M.T.			l	M.T.	l	M.T.			l	M.T.	l	M.T.
3,00	33	114	1	—	—	12,00	101	182	1	199	2	21,00	145	243	2	266	3
3,20	36	117				12,20						21,25	150	248		271	
3,50	39	120				12,50						21,50					
3,80	43	124				12,80						21,75					
4,00						13,00						22,00					
4,20						13,20						22,25					
4,50	47	128				13,50	108	189		206		22,50	155	253		276	
4,80	52	133				13,80						22,75					
5,00						14,00						23,00					
5,20	57	138				14,25	114	212	2	—	—	23,25		276	3	—	—
5,50						14,50						23,50					
5,80						14,75						23,75	160	281			
6,00						15,00						24,00					
6,20	63	144				15,25	120	218				24,25					
6,50						15,50						24,50					
6,80	69	150				15,75						24,75					
7,00						16,00						25,00					
7,20						16,25	125	223				25,25	165	286			
7,50						16,50						25,50					
7,80	75	156				16,75						25,75					
8,00						17,00						26,00					
8,20						17,25	130	228				26,25					
8,50						17,50						26,50					
8,80	81	162				17,75						26,75	170	291		319	4
9,00						18,00						27,00					
9,20						18,25	135	233		256	3	27,25					
9,50						18,50						27,50					
9,80	87	168				18,75						27,75					
10,00						19,00						28,00					
10,20						19,25	140	238		261		28,25	175	296		324	
10,50						19,50						28,50					
10,80	94	175				19,75						28,75					
11,00						20,00						29,00					
11,20						20,25	145	243		266		29,25					
11,50						20,50						29,50					
11,80						20,75						29,75					

Dimensions in millimetres (*end*)

d	l_1	Standard shank		Oversize shank	
		l	M.T.	l	M.T.
30,00	175	296	3	324	4
30,25	180	301		329	
30,50					
30,75					
31,00					
31,25					
31,50					
31,75	185	306		334	
32,00		334	4	—	—
32,50					
33,00					
33,50					
34,00	190	339			
34,50					
35,00					
35,50					
36,00	195	344			
36,50					
37,00					
37,50					
38,00	200	349			
38,50					
39,00					
39,50					
40,00					
40,50	205	354		392	5
41,00					
41,50					
42,00					
42,50					
43,00	210	359		397	
43,50					

d	l_1	Standard shank		Oversize shank	
		l	M.T.	l	M.T.
44,00	210	359	4	397	5
44,50					
45,00					
45,50	215	364		402	
46,00					
46,50					
47,00					
47,50					
48,00	220	369		407	
48,50					
49,00					
49,50					
50,00					
50,50	225	374		412	
51		412	5	—	—
52					
53					
54	230	417			
55					
56					
57	235	422			
58					
59					
60					
61	240	427			
62					
63					
64	245	432		499	6
65					
66					
67					
68	250	437		504	

d	l_1	Standard shank		Oversize shank	
		l	M.T.	l	M.T.
69	250	437	5	504	6
70					
71					
72	255	442		509	
73					
74					
75					
76	260	447	6	514	—
77		514		—	
78					
79					
80					
81	265	519			
82					
83					
84					
85					
86	270	524			
87					
88					
89					
90					
91	275	529			
92					
93					
94					
95					
96	280	534			
97					
98					
99					
100					



5.2 Dimensions in inches

d	l_1	Standard shank		Oversize shank		d	l_1	Standard shank		Oversize shank		d	l_1	Standard shank		Oversize shank	
		l	M.T.	l	M.T.			l	M.T.	l	M.T.			l	M.T.	l	M.T.
1/8	1 7/16	4 5/8	1	—	—	23/32	5 1/4	9 1/8	2	10	3	1 5/16	7 1/4	13 1/8	4	—	—
9/64	1 17/32	4 3/4				47/64						1 21/64					
5/32	1 11/16	4 27/32				3/4						1 1/32					
11/64	1 27/32	5 1/32				49/64	5 1/2	9 3/8		10 1/4		1 23/64	7 1/2	13 3/8			
3/16	2 1/16	5 1/4				25/32						1 3/8					
13/64						51/64						1 25/64					
7/32	2 1/4	5 7/16				13/16	5 3/4	9 5/8		10 1/2		1 13/32					
15/64						53/64						1 27/64					
1/4	2 1/2	5 11/16				27/32						1 7/16	7 5/8	13 1/2		—	—
17/64	2 23/32	5 29/32				55/64	5 7/8	9 3/4		10 5/8		1 29/64					
9/32						7/8						1 15/32					
19/64						57/64		10		10 7/8		1 31/64					
5/16	2 15/16	6 1/8				29/32	6 1/8					1 1/2					
21/64						59/64		10 7/8	3	—	—	1 33/64	7 7/8	13 3/4			
11/32	3 3/16	6 3/8				15/16						1 17/32					
23/64						61/64	6 1/4	11				1 35/64					
3/8						31/32						1 9/16					
25/64	3 7/16	6 7/8				63/64						1 37/64					
13/32						1	6 1/2	11 1/4				1 19/32					
27/64						1 1/64						1 39/64					
7/16	3 11/16	6 7/8				1 1/32						1 5/8	8 1/8	14		15 1/2	
29/64						1 5/8	6 5/8	11 3/8		12 1/2		1 41/64					
15/32						1 1/16						1 21/32					
31/64	3 31/32	7 5/32				1 5/64						1 43/64					
1/2					2	1 3/32						1 11/16					
33/64						1 7/64						1 45/64					
17/32	4 1/4	7 7/16		8 1/8		1 1/8	6 7/8	11 5/8		12 3/4		1 23/32	8 1/4	14 1/8		15 5/8	5
35/64						1 9/64					4	1 47/61					
9/16	4 1/2	8 3/8	2	—	—	1 5/32						1 3/4					
37/64						1 11/64						1 49/64					
19/32						1 3/16						1 25/32					
39/64	4 3/4	8 5/8				1 13/64	7 1/8	11 7/8		13		1 51/64					
5/8						1 7/32						1 13/16					
41/64	4 7/8	8 3/4				1 15/64						1 53/64	8 1/2	14 3/8		15 7/8	
21/32						1 1/4		12		13 1/8		1 27/32					
43/64						1 17/64	7 1/4					1 55/64					
11/16	5 1/8	9				1 9/32		13 1/8	4	—	—	1 7/8	8 5/8	14 1/2		16	
45/64						1 19/64						1 57/64					

Dimensions in inches (*end*)

d	l_1	Standard shank		Oversize shank		*d*	l_1	Standard shank		Oversize shank		*d*	l_1	Standard shank		Oversize shank	
		l	M.T.	*l*	M.T.			*l*	M.T.	*l*	M.T.			*l*	M.T.	*l*	M.T.
1 29/32						2 15/32	9 1/2	16 7/8		—	—	3 1/8	10 1/4	20 1/4			
1 59/64	8 5/8	14 1/2		16		2 1/2						3 5/32					
1 15/16						2 15/32						3 3/16					
1 61/64			4		5	2 2/19	9 5/8	17		19 5/8		3 7/32					
1 31/32						2 19/32						3 1/4	10 3/8	20 3/8			
1 63/64		14 3/4		16 1/4		2 5/8						3 9/32					
2	8 7/8					2 21/32						3 5/16					
2 1/32		16 1/4				2 11/16						3 11/32					
2 1/16						2 23/32	9 7/8	17 1/4		19 7/8		3 3/8					
2 3/32						2 3/4						3 13/32					
2 1/8	9	16 3/8				2 25/32			5		6	3 7/16	10 5/8	20 5/8	6	—	—
2 5/32						2 13/16						3 15/16					
2 3/16						2 27/32						3 1/2					
2 7/32			5	—	—	2 7/8	10	17 3/8		20		3 9/16					
2 1/4						2 29/32						3 5/8	10 7/8	20 7/8			
2 9/32	9 1/4	16 5/8				2 15/16						3 11/16					
2 5/16						2 31/32		17 5/8		20 1/4		3 3/4					
2 11/32						3						3 13/16	11	2			
2 3/8						3 1/32	10 1/4					3 7/8					
2 13/32	9 1/2	16 7/8				3 1/16		20 1/4	6	—	—	3 15/16	11 1/4	21 1/4			
2 7/16						3 3/32						4					

NOTES relating to the tables in 5.1 and 5.2

1 **Intermediate sizes**

When intermediate sizes are needed, reference should be made to the general table in 5.3 for the corresponding lengths.

2 **Cutting portion**

— Tolerance on diameter *d* measured near the point : h8.

For dimensions in inches, direct conversion into inches of the metric values of the tolerances h8.

— Back taper : at the manufacturer's discretion

— Hand of cutting, unless otherwise specified : right.

3 **Shank**

— standard or oversize;

— Morse tapers in accordance with ISO 296.

4 **Tolerance on lengths**

See general table in 5.3.

5.3 General table : Corresponding lengths, in millimetres and in inches, set out as functions of diameter steps

Diameter ranges d				Corresponding lengths										
over	incl.	over	incl.	l_1	standard shank		oversize shank		l_1	standard shank		oversize shank	
					l	M.T.	l	M.T.		l	M.T.	l	M.T.
mm		in		mm					in				
2,65	3,00	0.104 3	0.118 1	33	114				1 5/16	4 1/2			
3,00	3,35	0.118 1	0.131 9	36	117				1 7/16	4 5/8			
3,35	3,75	0.131 9	0.147 6	39	120				1 17/32	4 3/4			
3,75	4,25	0.147 6	0.167 3	43	124				1 11/16	4 27/32			
4,25	4,75	0.167 3	0.187 0	47	128				1 27/32	5 1/32			
4,75	5,30	0.187 0	0.208 7	52	133		—	—	2 1/16	5 1/4		—	—
5,30	6,00	0.208 7	0.236 2	57	138				2 1/4	5 7/16			
6,00	6,70	0.236 2	0.263 8	63	144	1			2 1/2	5 11/16	1		
6,70	7,50	0.263 8	0.295 3	69	150				2 23/32	5 29/32			
7,50	8,50	0.295 3	0.334 6	75	156				2 15/16	6 1/8			
8,50	9,50	0.334 6	0.374 0	81	162				3 3/16	6 3/8			
9,50	10,60	0.374 0	0.417 3	87	168				3 7/16	6 5/8			
10,60	11,80	0.417 3	0.464 6	94	175				3 11/16	6 7/8			
11,80	13,20	0.464 6	0.519 7	101	182		199	2	3 31/32	7 5/32		7 27/32	2
13,20	14,00	0.519 7	0.551 2	108	189		206		4 1/4	7 7/16		8 1/8	
14,00	15,00	0.551 2	0.590 6	114	212				4 1/2	8 3/8			
15,00	16,00	0.590 6	0.629 9	120	218		—	—	4 3/4	8 5/8		—	—
16,00	17,00	0.629 9	0.669 3	125	223				4 7/8	8 3/4			
17,00	18,00	0.669 3	0.708 7	130	228				5 1/8	9			
18,00	19,00	0.708 7	0.748 0	135	233	2	256		5 1/4	9 1/8	2	10	
19,00	20,00	0.748 0	0.787 4	140	238		261		5 1/2	9 3/8		10 1/4	
20,00	21,20	0.787 4	0.834 6	145	243		266	3	5 3/4	9 5/8		10 1/2	3
21,20	22,40	0.834 6	0.881 9	150	248		271		5 7/8	9 3/4		10 5/8	
22,40	23,02	0.881 9	0.906 2	155	253		276		6 7/8	10		10 7/8	
23,02	23,60	0.906 2	0.929 1		276					10 7/8			
23,60	25,00	0.929 1	0.984 2	160	281	3	—	—	6 1/4	11	3	—	—
25,00	26,50	0.984 2	1.043 3	165	286				6 1/2	11 1/4			

General table (*end*)

Diameter ranges d				Corresponding lengths									
over	incl.	over	incl.	l_1	standard shank		oversize shank		l_1	standard shank		oversize shank	
					l	M.T.	l	M.T.		l	M.T.	l	M.T.
mm		in			mm				in				
26,50	28,00	1.043 3	1.102 4	170	291	3	319	4	6 5/8	11 3/8	3	12 1/2	4
28,00	30,00	1.102 4	1.181 1	175	296		324		6 7/8	11 5/8		12 3/4	
30,00	31,50	1.181 1	1.240 2	180	301		329		7 1/8	11 7/8		13	
31,50	31,75	1.240 2	1.250 0	185	306		334		7 1/4	12		13 1/8	
31,75	33,50	1.250 0	1.318 9		334	4	—	—		13 1/8	4	—	—
33,50	35,50	1.318 9	1.397 6	190	339				7 1/2	13 3/8			
35,50	37,50	1.397 6	1.476 4	195	344				7 5/8	13 1/2			
37,50	40,00	1.476 4	1.574 8	200	349				7 7/8	13 3/4			
40,00	42,50	1.574 8	1.673 2	205	354		392	5	8 1/8	14		15 1/2	5
42,50	45,00	1.673 2	1.771 6	210	359		397		8 1/4	14 1/8		15 5/8	
45,00	47,50	1.771 6	1.870 1	215	364		402		8 1/2	14 3/8		15 7/8	
47,50	50,00	1.870 1	1.968 5	220	369		407		8 5/8	14 1/2		16	
50,00	50,80	1.968 5	2.000 0	225	374		412		8 7/8	14 3/4		16 1/4	
50,80	53,00	2.000 0	2.086 6		412	5	—	—		16 1/4	5	—	—
53,00	56,00	2.086 6	2.204 7	230	417				9	16 3/8			
56,00	60,00	2.204 7	2.362 2	235	422				9 1/4	16 5/8			
60,00	63,00	2.362 2	2.480 3	240	427				9 1/2	16 7/8			
63,00	67,00	2.480 3	2.637 8	245	432		499	6	9 5/8	17		19 5/8	6
67,00	71,00	2.637 8	2.795 3	250	437		504		9 7/8	17 1/4		19 1/4	
71,00	75,00	2.795 3	2.952 8	255	442		509		10	17 3/8		20	
75,00	76,20	2.952 8	3.000 0	260	447		514		10 1/4	17 5/8		20 1/4	
76,20	80,00	3.000 0	3.149 6		514	6	—	—		20 1/4	6	—	—
80,00	85,00	3.149 6	3.346 5	265	519				10 3/8	20 3/8			
85,00	90,00	3.346 5	3.543 3	270	524				10 5/8	20 5/8			
90,00	95,00	3.543 3	3.740 2	275	529				10 7/8	20 7/8			
95,00	100,00	3.740 2	3.937 0	280	534				11	21			
100,00	106,00	3.937 0	4,173 2	285	539				11 1/4	21 1/4			

NOTES

1 **Tolerance on lengths**

Lengths l and l_1 may vary, within one diameter step, between the minimum and maximum limits corresponding respectively to the figures given for the nearest lower or upper step (increased or reduced, as far as the total length is concerned, by the difference between the lengths of the two tapers, if the taper combined with one of the two adjacent steps is larger or smaller than that of the step in question).

Example : For the diameter 15 mm, length l_1 may vary between 108 and 120 from the nominal value 114 mm, with a tolerance of ± 6. As the tolerance for l is the same as for l_1 (± 6), l can vary between 206 and 218 from the nominal value 212 mm.

2 **Standardized diameters** in millimetres and in inches : see the tables in 5.1 and 5.2.