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

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National foreword

This British Standard is the UK implementation of ISO 235:2016.

The UK participation in its preparation was entrusted to Technical Committee MTE/18, Tools tips and inserts for cutting applications.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INTERNATIONAL STANDARD

ISO 235

Third edition
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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

Reference number
ISO 235:2016(E)

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 29, *Small tools*, Subcommittee SC 2, *Holding tools, adaptive items and interfaces*.

This third edition cancels and replaces the second edition (ISO 235:1980), of which it constitutes a minor revision, notably with the addition of Annex A, which gives the relationship between the designations of this document and the ISO 13399 series. It also incorporates the Technical Corrigendum ISO 235:1980/Cor 1:1996.

INTERNATIONAL STANDARD ISO 235:2016(E)

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

1 Scope

This document specifies the dimensions of the following three types of drills:

a) parallel shank drills, stub series;

b) parallel shank drills, jobber series;

c) Morse taper shank drills.

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

a) the dimensions in millimetres;

b) the dimension in inches;

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

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 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 value 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 value of h8, converted directly into inches for inch drills.

5 Parallel shank twist drills, stub series

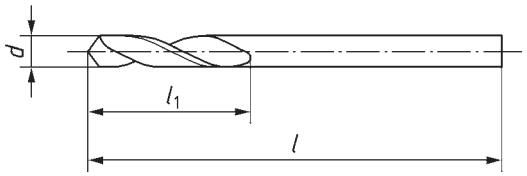


Figure 1

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

Table 1 *(continued)*

d	l_1	l	d	l_1	l	d	l_1	l	d	l_1	l
9,00	40	84	18,00			27,00	81	162	40,00		
9,20			18,25	64	127	27,25					
When intermediate sizes are needed, reference is to be made to Table 3 for the corresponding lengths. 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. Shank: these drills are normally made without driving tenon. For tolerances on lengths, see Table 3.											

Table 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 5/16	6 5/8
3/32	9/16	1 11/16	19/32	2 9/32	4 17/32	1 3/32		
7/64	5/8	1 13/16	39/64			1 7/64		
1/8	11/16	1 15/16	5/8			1 1/8		
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	2 7/16	4 27/32	1 11/64		
3/16	1 1/32	2 7/16	11/16			1 3/16	3 7/16	6 27/32
13/64			45/64			1 13/64		
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	2 19/32	5 5/32	1 1/4	3 17/32	7 3/32
17/64	1 5/16	2 29/32	49/64			1 17/64		
9/32			25/32			1 9/32		
19/64	1 7/16	3 1/8	51/64	2 11/16	5 11/32	1 19/64		
5/16			13/16			1 5/16		
21/64			53/64			1 21/64	3 21/32	7 5/16
11/32	1 9/16	3 5/16	27/32	2 3/4	5 9/16	1 11/32		
23/64			55/64			1 23/64		
3/8	1 11/16	3 1/2	7/8			1 3/8		
25/64			57/64	2 27/32	5 3/4	1 25/64		
13/32			29/32			1 13/32	3 25/32	7 19/32
27/64	1 27/32	3 3/4	59/64			1 27/64		
7/16			15/16	2 15/16	5 15/16	1 7/16		
29/64			61/64			1 29/64		
15/32			31/32			1 15/32		

Table 2 *(continued)*

d	l_1	l	d	l_1	l	d	l_1	l
31/64	2	4	63/64	3 1/16	6 1/8	1 31/64	3 15/16	7 7/8
1/2			1			1 1/2		
33/64			1 1/64					
When intermediate sizes are needed, reference is to be made to Table 3 for the corresponding lengths. 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. Shank: these drills are normally made without driving tenon. For tolerances on lengths, see Table 3.								

Table 3 — Corresponding lengths for parallel shank twist drills, stub series set out as functions of diameter

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	2 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

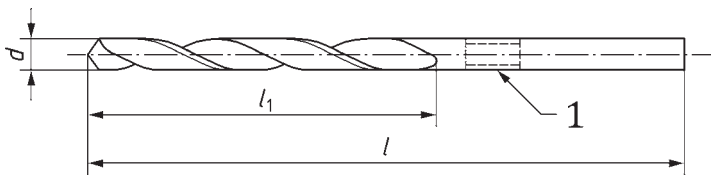
Table 3 *(continued)*

Diameter ranges, *d*				**Corresponding lengths**			
over	incl.	over	incl.	l_1	l	l_1	l
mm		in		mm		in	
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 3/8
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 0	75	151	2 15/16	5 15/16
25,00	26,50	0,984 0	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 4	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

NOTE 1 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 Table 6 and Table 9.

NOTE 2 Standardized diameters in millimetres and in inches: see Table 1 and Table 2, respectively.

6 Parallel shank twist drills, jobber series



Key

1 recess optional

Figure 2

Table 4

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	19	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			3,40			7,40			11,40			19,00		

Table 4 *(continued)*

d	l_1	l	d	l_1	l	d	l_1	l	d	l_1	l	d	l_1	l
1,25	16	38	3,50	39	70	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					
When intermediate sizes are needed, reference is to be made to Table 6 for the corresponding lengths. 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. Shank: these drills are normally made without driving tenon. For tolerances on lengths, see Table 6.														

Table 5

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		

Table 5 *(continued)*

d	l_1	l
27/64	3 11/16	5 19/32
7/16		
29/64		
15/32	3 31/32	5 15/16
31/64		
1/2		
When intermediate sizes are needed, reference is to be made to Table 6 for the corresponding lengths. 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. Shank: these drills are normally made without driving tenon. For tolerances on lengths, see Table 6.		

Table 6 — Corresponding lengths for parallel shank twist drills, jobber series 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	19	3/32	3/4
0,24	0,30	0,009 4	0,011 8	3		1/8	
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
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

Table 6 *(continued)*

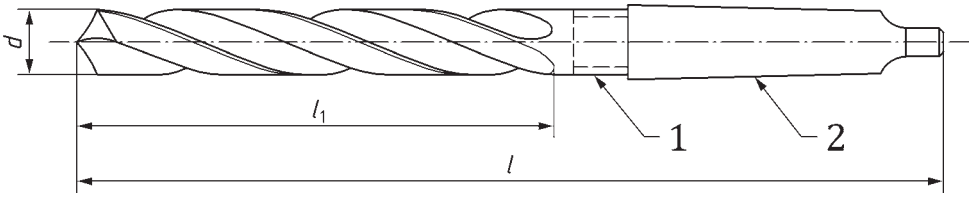
Diameter ranges, *d*				**Corresponding lengths**			
over	incl.	over	incl.	l_1	l	l_1	l
mm		in		mm		in	
3,00	3,35	0,118 1	0,131 9	36	65	1 7/16	2 9/16
3,35	3,75	0,131 9	0,147 6	39	70	1 17/32	2 3/4
3,75	4,25	0,147 6	0,167 3	43	75	1 11/16	2 15/16
4,25	4,75	0,167 3	0,187 0	47	80	1 27/32	3 5/32
4,75	5,30	0,187 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

NOTE 1 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, 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.

NOTE 2 For standardized diameters in millimetres and in inches, see the Table 4 and Table 5, respectively.

7 Morse taper shank twist drills



Key

1 recess optional

2 Morse taper ISO 296

Figure 3

Table 7

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				12,00						21,00	145	243		266	
3,20	36	117				12,20						21,25					
3,50	39	120				12,50	101	182		199		21,50					
3,80						12,80						21,75	150	248		271	
4,00	43	124				13,00			1		2	22,00			2		3
4,20						13,20						22,25					
4,50	47	128				13,50						22,50					
4,80						13,80	108	189		206		22,75		253		276	
5,00	52	133				14,00						23,00	155				
5,20						14,25						23,25		276			
5,50						14,50	114	212				23,50					
5,80	57	138				14,75						23,75					
6,00						15,00						24,00					
6,20	63	144				15,25						24,25	160	281			
6,50						15,50	120	218		—	—	24,50					
6,80						15,75						24,75					
7,00	69	150				16,00						25,00			3	—	—
7,20			1	—	—	16,25						25,25					
7,50						16,50	125	223				25,50					
7,80						16,75						25,75	165	286			
8,00	75	156				17,00						26,00					
8,20						17,25			2			26,25					
8,50						17,50	130	228				26,50					
8,80						17,75						26,75					
9,00	81	162				18,00						27,00					
9,20						18,25						27,25	170	291		319	
9,50						18,50	135	233		256		27,50					
9,80						18,75						27,75					

Table 7 *(continued)*

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.
10,00	87	168				19,00						28,00					
10,20						19,25						28,25					4
10,50						19,50	140	238		261	3	28,50					
10,80						19,75						28,75					
11,00						20,00						29,00	175	296	3	324	
11,20	94	175				20,25						29,25					
11,50						20,50	145	243		266		29,50					
11,80						20,75						29,75					
...						...						...					
30,00	175	296		324		44,00						69					
30,25						44,50	210	359		397		70	250	437		504	
30,50						45,00						71					
30,75	180	301	3	329	4	45,50						72			5		6
31,00						46,00						73	255	442		509	
31,25						46,50	215	364		402		74					
31,50						47,00						75					
31,75		306		334		47,50			4		5	76		447		514	
32,00						48,00						77					
32,50	185	334				48,50						78	260	514			
33,00						49,00	220	369		407		79					
33,50						49,50						80					
34,00						50,00						81					
34,50	190	339				50,50		374		412		82					
35,00						51	225					83	265	519			
35,50						52		412				84					
36,00				—	—	53						85					
36,50	195	344				54						86					
37,00						55	230	417				87					
37,50			4			56						88	270	524	6	—	—

Table 7 *(continued)*

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.
38,00						57				—	—	89					
38,50						58						90					
39,00	200	349				59	235	422				91					
39,50						60			5			92					
40,00						61						93	275	529			
40,50						62	240	427				94					
41,00						63						95					
41,50	205	354		392		64						96					
42,00					5	65	245	432		499		97					
42,50						66					6	98	280	534			
43,00	210	359		397		67						99					
43,50						68	250	437		504		100					

When intermediate sizes are needed, reference is to be made to Table 9 for the corresponding lengths.

Cutting portion

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

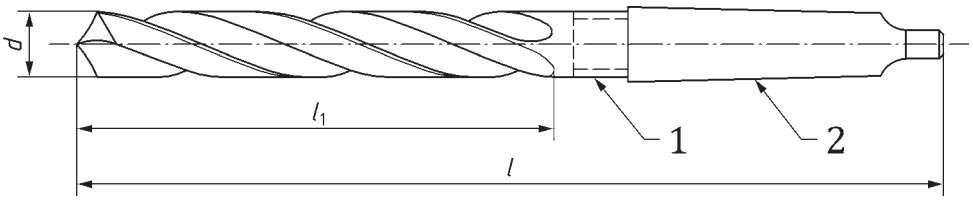
For dimensions in inches, direct conversion into inches of the metric values of the tolerance h8.

— Back taper: at the manufacturer's discretion.

— Hand of cutting, unless otherwise specified: right.

Shank: these drills are normally made without driving tenon.

For tolerances on lengths, see Table 9.



Key

1 recess optional

2 Morse taper ISO 296

Figure 4

Table 8

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

Table 8 *(continued)*

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.
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	8 1/2	14 3/8		15 7/8	
41/64	4 7/8	8 3/4				1 15/64						1 53/64					
21/32						1 1/4		12		13 1/8		1 27/32					
43/64						1 17/64	7 1/4		13 1/8			1 55/64					
11/16	5 1/8	9				1 9/32		13 1/8		—	—	1 7/8	8 5/8	14 1/2		16	
45/64						1 19/64						1 57/64					
…						…						…					
1 29/32						2 15/32	9 1/2	16 7/8		—	—	3 1/8	10 1/4	20 1/4			
1 59/64						2 1/2						3 5/32					
1 15/16	8 5/8	14 1/2		16		2 17/32						3 3/16					
1 61/64			4		5	2 9/16	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	5	19 7/8		3 3/8					
2 3/32						2 3/4					6	3 13/32					
2 1/8						2 25/32						3 7/16	10 5/8	20 5/8			
2 5/32	9	16 3/8				2 13/16						3 15/32					
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	21			

Table 8 *(continued)*

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.
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					

When intermediate sizes are needed, reference is to be made to Table 9 for the corresponding lengths.

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.

Shank: these drills are normally made without driving tenon.

For tolerances on lengths, see Table 9.

Table 9 — Corresponding lengths for Morse taper shanks twist drills 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	1	—	—	2 1/4	5 7/16		—	—
6,00	6,70	0,236 2	0,263 8	63	144				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	1	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		—	—	6 1/4	11		—	—
25,00	26,50	0,984 2	1,043 3	165	286				6 1/2	11 1/4			
26,50	28,00	1,043 3	1,102 4	170	291	3	319		6 5/8	11 3/8	3	12 1/2	
28,00	30,00	1,102 4	1,181 1	175	296		324	4	6 7/8	11 5/8		12 3/4	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					13 1/8			
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			

Table 9 *(continued)*

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				
40,00	42,50	1,574 8	1,673 2	205	354	4	392	5	8 1/8	14	4	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					16 1/4			
53,00	56,00	2,086 6	2,204 7	230	417	5	—	—	9	16 3/8	5	—	—
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	517				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			

NOTE 1 *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 4 mm, l_1 may vary between 39 and 47 from the nominal value 43 mm, and *l* may vary between 70 and 80 from the nominal value 75 mm.

NOTE 2 For standardized diameters in millimetres and in inches, see the Table 7 and Table 8, respectively.

Annex A
(informative)

Relationship between designations in this document and ISO 13399 (all parts)

For relationship between designations in this document and preferred symbols according to ISO 13399 (all parts), see Table A.1.

Table A.1 — Relationship between designations in this document and ISO 13399 (all parts)

Symbol in this document	Reference in this document	Property name in ISO 13399 (all parts)	Symbol in ISO 13399 (all parts)	Reference in ISO 13399 (all parts)
d	Figure 1 Table 1, Table 2, and Table 3 Figure 2 Table 4, Table 5 and Table 6 Figure 3 Table 7, Table 8 and Table 9 Figure 4	cutting diameter	DC	71D084653E57F
l_1	Figure 1 Table 1, Table 2, and Table 3 Figure 2 Table 4, Table 5 and Table 6 Figure 3 Table 7, Table 8 and Table 9 Figure 4	length chip flute	LCF	71DCCC27DEF53
l	Figure 1 Table 1, Table 2, and Table 3 Figure 2 Table 4, Table 5 and Table 6 Figure 3 Table 7, Table 8 and Table 9 Figure 4	overall length	OAL	71D078EB7C086
Morse taper ISO 296	Figure 3 and Figure 4	connection size code machine side	CZCMS	71EBDBF5060E6
M.T.	Table 7, Table 8 and Table 9	connection size code machine side	CZCMS	71EBDBF5060E6

Bibliography

[1] ISO 296, *Machine tools — Self-holding tapers for tool shanks*

[2] ISO 13399 (all parts), *Cutting tool data representation and exchange*

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